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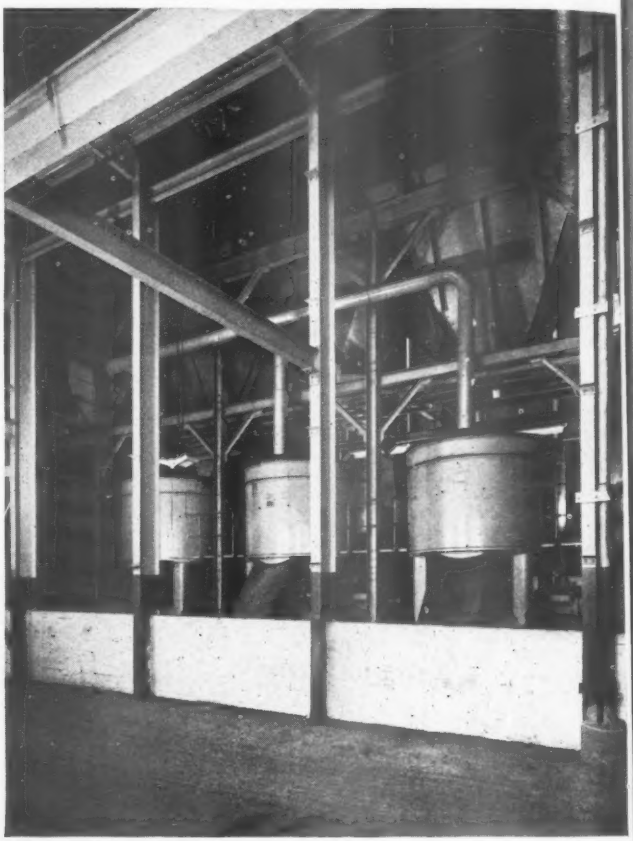

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The Case of the Welsh Foundries

Recently in the House of Commons, Mr. George Thomas, M.P., brought up the question of the closing of the B.S.A. foundry at Cardiff. It was not a very large concern, about 116 men being employed. Of these 77 were dismissed, but at least 41 have since found other jobs. Rightly, Mr. Thomas expressed concern for apprentices whose training is interrupted by the closing of foundries and we hope that steps will be taken in such cases to ensure the continuation of the apprentices' training at other firms. The Parliamentary Secretary to the Ministry of Labour and National Service made the following serious statement: " The difficulty . . . is that in this industry the conditions are changing in such a way that the volume of orders in future is unlikely to be sufficient to employ all those who have been employed in the industry in the past."

What the Parliamentary Secretary meant by volume is not quite clear. If he referred to value then it is as well to bear in mind that an expanding business is being done in the more expensive kinds of castings. If weight is to be understood, then a single order for a new tube railway in London would, over the years of its construction, profoundly affect the output of iron castings.

We regard this case of the B.S.A. Cardiff foundry as a typical case of arguing from the particular to the general. To have made a debate profitable, all the foundries which have been closed during the last two years should have been considered. Then a variety of reasons would have come to light and included such factors as:—The area of a foundry being put to better use as a machine-shop; over capacity in one section of the industry; too much reliance being placed on the one big customer; inability to conform with the newest foundry regulations (for the smaller " fry "), and a whole list of causes coming under the general heading of inefficiency—either in manufacturing or on the sales side. By and large, far too many founders have relied on local firms to provide them with work. It is true to state that one South Wales foundry is regularly despatching castings to all quarters of the United Kingdom. Perhaps and probably salesmanship is the weakest link in the chain of the foundry industry. There are, it is pleasing to state, some brilliant exceptions.

Giddings & Lewis/Fraser, Limited, Link-up

Douglas Fraser & Sons, Limited, Arbroath, and Giddings & Lewis Machine Tool Company, of Fond du Lac, Wisconsin, USA, announce the formation of a new British private company named Giddings & Lewis - Fraser, Limited, having an authorised capital of £1,516,327. The purpose of this company is to acquire and continue the engineering business of Douglas Fraser & Sons, Limited, and to manufacture Giddings & Lewis horizontal boring, drilling and milling machines. Fraser textile-machinery activities will be conducted by the new company, but the other textile manufacturing interests of Fraser will continue to be operated, as in the past, by Douglas Fraser & Sons, Limited.

To establish continuity of management Mr. Norman Fraser has been appointed chairman, Mr. John G. Fraser, managing director, and the other Fraser nominees to the board are Mr. John Macgregor and Mr. Charles N. Thomson. Directors nominated by the USA company are Mr. Ralph J. Kraut, president of Giddings & Lewis Machine Tool Company, Mr. William E. Rutz, Mr. Russell E. Hanson, and Mr. Morton R. Swift, vice-president Giddings & Lewis foreign operations, resident in London.

The Rockwell Machine Tool Company, Limited, Welsh Harp, Edgware Road, London, N.W.2, will retain the sole selling rights in the United Kingdom for all Giddings & Lewis designed machine tools, including those manufactured by the new company. Mr. Milton H. Nichols, present European sales manager of the American company, will continue in this capacity, with his headquarters in London. Sidney G. Jones & Company, Limited, 8, Balham Hill, London, S.W.12, will remain sole selling agents in the United Kingdom for Fraser Endomatic machine tools. The traditional products of the Fraser engineering division which will be now manufactured by the new company are textile machinery, machine tools, gears and gear-reduction units. This agreement brings together two very progressive old-established companies, each of which has celebrated its centenary.

Douglas Fraser & Sons, Limited

From the sailcloth power-loom weaving factory started in Arbroath by Douglas Fraser in 1832, the firm of Douglas Fraser & Sons, Limited, has developed into one of the best equipped foundries and engineering shops of its kind in the country, with a present-day payroll of over 700 employees, nearly 30,000 sq. ft. of floor space and a developable ground area of approximately 7¼ acres. The works at Arbroath are completely self-contained, with a Meehanite foundry (licensed in 1936) served by its own patternmaking department; modern machine shops and toolroom; heat-treatment and forge departments; and fabricating and erecting shops. The foundry will have to be extended as the new lines of machines to be made under the new conditions will demand heavier castings than it is now capable of making.

Giddings & Lewis Machine Tool Company is one of the largest of its kind in the United States and incorporates companies formerly known as the Cincinnati Planer Company, the Cincinnati-Bickford Tool Company, Davis Boring Tool Company, Kaukauna Machine Corporation, and the Prescot Company, Menominee.

Anniversary Meeting at Coalbrookdale

In 1709, the Quaker ironmaster and founder, Abraham Darby, introduced a process of smelting iron with coke which made economically and technically possible the rapid expansion of the iron industry. For centuries the small output of iron in this country had relied upon charcoal as the reducing fuel, and this state of affairs continued until the mid-18th century, when the iron industry of the UK was dying, and more and more iron was imported from overseas. At this period, Darby's process, developed originally at Coalbrookdale on the banks of the Severn, in Shropshire, began to be more widely used and by the close of the century coke had largely displaced charcoal as the basic fuel in iron smelting. By that time also, the motive power of the new era provided by the steam engine had substantially improved the blast-furnace process.

The achievement of Abraham Darby will be recognized by a three-day meeting on September 23 to 25, in Birmingham and Coalbrookdale, to commemorate the 250th anniversary of coke smelting, and the establishment of the Coalbrookdale Works. A committee has been set up under the chairmanship of Sir Frederick Scopes to organize the meeting and the following is an outline of the programme.

Wednesday, September 23: In the evening the opening lecture will be given at the University of Birmingham by Professor T. S. Ashton on the "Economic and Social Background of the Iron Industry in the Eighteenth Century."

Thursday, September 24: Presentation and discussion at the University of Birmingham of the following four papers:—(1) "Charcoal Iron Industry in Great Britain with special reference to Shropshire and the Development of the Industry up to 1750" by Mr. B. L. C. Johnson. (2) "The Contribution of the Darby Family to Ironmaking and the Iron Industry," by Dr. A. Raistrick. (3) "Coalbrookdale: 1709," by Dr. R. A. Mott and (4) "Ironfounding Past and Present" by Dr. J. G. Pearce, C.B.E. For the evening a dinner has been arranged at the Grand Hotel, Birmingham.

Friday, September 25: Visit by motor coach to the Coalbrookdale furnace which has been generously restored by Allied Ironfounders, Limited, which firm has also established a museum nearby. The visit will include tours of other sites of interest in the neighbourhood.

Further details and forms of registration can be obtained from the secretary, Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1.

Industrial Designs Protection

The President of the Board of Trade has appointed a committee under the chairmanship of Mr. Kenneth Johnston, Q.C., "to consider and report whether any, and if so what, changes are desirable in the law relating to the protection of industrial designs. In framing their recommendations the committee should include consideration of the desirability of enabling United Kingdom designs to receive cheap and effective protection in other countries on the basis of reciprocity." Any person or organization desirous of submitting suggestions or of giving evidence upon matters which fall within the terms of reference of the committee is invited to communicate with the joint secretaries, Designs Committee, Patent Office, 25, Southampton Buildings, London, W.C.2.

IBF Conference at Scarborough

Report on the Annual Meeting, Technical and Social Proceedings.

The June conference of the Institute of British Foundrymen, held in Scarborough under the auspices of the Tees-side branch, was an outstanding success and many of the participants pronounced it the best they had ever attended. What follows is a condensed report of the proceedings, it being felt that it is necessary to put this on record—with apologies for delay in publication due to the printing dispute.

The annual conference of the Institute of British Foundrymen was held in Scarborough, Yorkshire, during the week commencing Monday, June 8. In its basic arrangements, it resembled previous conferences with the exception that in this case the works visits were staged on the Thursday and further technical sessions on the Friday, instead of the usual procedure of concluding with works visits before the final dinner on the Friday. The registration for the conference—approaching 600—was not the largest attendance at an annual conference but it is a personal impression of the writer that more people stayed for the full duration of the programme than is usual.

Many of the conference delegates assembled in Scarborough with their wives (and in some cases families) on the Monday of conference week; Tuesday was devoted to General Council and com-

IBF Scarborough Conference scenes: (left to right) (a) Mrs. Draycott, Lady Fitton, Mr. H. H. Draycott and Sir Charles V. Fitton at the banquet reception; (b) Mr. A. E. Peace (retiring president) investing the incoming president, Mr. C. H. Wilson, with the Chain of Office (c) Mr. Barrington Hooper (chairman, FOUNDRY TRADE JOURNAL) congratulating Mr. J. B. Hollis after handing him the British Foundry Prize—Mr. T. C. Wilson (joint author with Mr. Hollis), who had just been awarded the British Foundry Medal, is in the background; (d) Mr. C. M. G. Wallwork (Lancashire branch president) and Mrs. Wallwork with Mr. and Mrs. C. G. While, also at the banquet reception.

The past-president, Mr. A. E. Peace, presenting the certificate of honorary membership to Sir Frederick Scopes.

mittee meetings, with a civic reception in the evening. On Wednesday morning, the annual general meeting of the Institute was held, followed by the Address of the new president and the Edward Williams' lecture, the afternoon being devoted to technical sessions. The daytime on Thursday and Friday was, as previously mentioned, occupied by works visits and technical sessions respectively, while on the Thursday evening there was a visit to the theatre and on Friday evening the concluding social event—a dance and cabaret show. The attractive background of Scarborough as a seaside resort with excellent hotel accommodation and adequate conference facilities contributed much to the success of the whole proceedings.

Mr. A. Garden (left) Dr. L. J. Petrzela (Czechoslovakia) and Mr. J. M. Hunter chatting informally at one of the social events during the conference.

The civic reception which, for many of the members, ladies and guests, really opened the proceedings at Scarborough was held at the Olympia Ballroom on the sea front. There was no formal reception of members by the Mayor, but both he (Councillor J. A. Kennedy, J.P.) and the Mayoress were present with the official party consisting of the retiring president, Mr. A. E. Peace, the then senior vice-president, Mr. C. H. Wilson, and junior vice-president, Mr. G. R. Shotton, and the secretary, Mr. G. Lambert, all of whom were accompanied by their ladies. During the evening, the Mayor expressed a welcome to the Institute and Mr. Peace, addressing the Mayor and Corporation, voiced the thanks of the assembly for the hospitality extended. Members and ladies were subsequently entertained by a cabaret show and dancing, and buffet refreshments were provided.

Annual General Meeting

Wednesday, June 10

The business part of the conference commenced with the 56th annual general meeting of the Institute held on the morning of Wednesday with Mr. A. E. Peace in the chair. A special welcome was first extended to overseas visitors, who included Mr. J. H. D. Hobson (Northern Rhodesia); Mr. G. B. Hobbs and Mr. S. Webster (South Africa); Mr. H. A. Burton (Canada); Mr. R. B. Whitelaw (Australia); Mr. and Mrs. M. C. M. Grandpierre (France); Dr. F. Hofmann (Switzerland); Mr. and Mrs. J. McCracken and Mr. S. P. Banerjee (India); and Dr. L. J. Petrzela (Czechoslovakia). Following the minutes and apologies for absence, the adoption of the annual report of the Council for the session 1958/59 (previously published) was proposed by the president, seconded by Mr. J. Blakiston (past-president) and approved without dissent. In a similar manner, the balance sheet and accounts were disposed of on the proposition of Mr. N. P. Newman, hon. treasurer, supported by Mr. H. J. V. Williams.

Mr. M. M. Hallett, as chairman, then proposed adoption of the Institute's Technical Council report and in doing so outlined some of the salient features of the year's activity and the Institute's relations with other technical bodies. Special reference was made to the report of the TS 46 sub-committee (dealing with the effect of mould materials on the cooling rate and physical properties of cast metals) given as the Institute's sponsored paper at the April convention of the American Foundrymen's Society and which was also to be discussed during the IBF conference.

Dr. D. V. Atterton, vice-chairman of the Technical Council, seconded the proposition and briefly surveyed the activities of various other sub-committees, announcing the formation and terms of reference of four new sub-committees, making a total of 15 at present active.

Presentation of Awards

Mr. Peace from the chair then officiated in the ceremony of presentation of Institute awards made

Part of the top table during the annual banquet held in the Grand Hotel, Scarborough: (from left to right) Mrs. G. R. Shotton, Mr. T. H. Summerson, J.P. (Deputy Lieutenant, County of Durham—chairman and joint managing director, Summerson's Foundries, Limited), Mrs. Summerson, Mr. G. W. Ilsley (Master, the Worshipful Company of Founders), Mrs. Ilsley, Col. Sir William A. Worsley, Bt., J.P., (Lord Lieutenant, Yorkshire N.R.), Lady Worsley, Mr. C. H. Wilson (president), Mrs. Wilson, Councillor J. A. Kennedy, J.P., (Mayor of Scarborough), Mrs. Kennedy, Mr. A. E. Peace (immediate past-president) and Mrs. Peace—Dr. and Mrs. C. J. Dadswell are in the foreground.

during the current session. The first was the granting of honorary membership to Sir Frederick Scopes in recognition of distinguished services to the industry and to the Institute (Sir Frederick Scopes served as president of the Joint Iron Council, chairman of the board of governors of the National Foundry College, and as president of the British Cast Iron Research Association).

E. J. Fox Medal

The next presentation was that of the E. J. Fox medal to Dr. C. J. Dadswell, a past-president of the Institute, in recognition of his exceptional services to the Institute and the industry during his very distinguished career. In acknowledging this award Dr. Dadswell said the citation seemed to him the wrong way round in that he should be giving something to the Institute for its services to him during the past 30 years.

Meritorious Services Medal

For outstanding work for the Institute over the whole period of his 46 years membership, the award was made of the meritorious services medal to Mr. Ben Hird. Again in his acknowledgment, Mr. Hird said that for whatever he had given to the Institute he had had a four-fold return, and that this was the crowning pleasant event of his many happy years with the Institute.

British Foundry Medal and Prize

Mr. Barrington Hooper, C.B.E., representing FOUNDRY TRADE JOURNAL (the donors), was called upon to present the next award, that of the British Foundry Medal and Prize. The medal was presented to Mr. T. C. Wilson in recognition of the excellence of his paper describing the CO_2 Process at J. Blakeborough & Sons, Limited, which had been published during the period under review. Making the presentation to Mr. Wilson and of the British Foundry Prize (awarded jointly with the medal) to Mr. J. B. Hollis, co-author with Mr. Wilson, Mr. Hooper remarked jocularly that it gave him special pleasure to make the award in person, since it seemed that he was the only donor of an award of longstanding who was able to do so—all the other original donors being deceased!

John Bell Scholarship

Making this travelling scholarship award to Mr. William B. Morrison for his work during the degree course at the Royal College of Science and Technology, Glasgow, the president remarked that the occasion should be a highlight in Mr. Morrison's career, and he asked him particularly to remember the man with whose name the scholarship was associated.

Diplomas

The next item in the proceedings was the presentation of diplomas for outstanding papers presented to the Institute during the period under review. The recipients were: Mr. J. H. Osborn, Mr. T. A. Marsden and Mr. R. F. Horton for their joint paper describing a modern foundry for the manufacture of small steel castings by new moulding techniques; Mr. H. G. C. King for his paper outlining methods of patternmaking in plastics, and Mr. G. C. B. Lamb for his paper "Towards Automation" which had been the IBF sponsored paper presented to the Institute of Australian Foundrymen.

Other conference scenes: (left to right)—(left) Mrs. C. H. Wilson, wife of the new president, presenting a bouquet to Mrs. J. A. Kennedy, Mayoress of Scarborough, with Mr. Frank Shepherd (chairman, conference committee) in the background; (right) Mrs. Shotton, Mr. R. B. Whitelaw (Australia), Mr. G. R. Shotton (senior vice-president), Mr. D. A. Richards (junior vice-president), Mrs. Richards and Dr. A. B. Everest (past-president) at the banquet reception.

Election of Officers

The next item on the agenda was the formal election of officers for the 1959/60 session, during which the following were chosen (as briefly recorded also in the JOURNAL for June 11): *As president,* Mr. C. H. Wilson; *as senior vice-president,* Mr. G. R. Shotton; *and as junior vice-president,* Mr. D. A. Richards.

When he invested Mr. Wilson with the "harness" of office, the retiring president, Mr. Peace, remarked that at last someone had been found whose stature it fitted! Mr. Wilson then asked Mr. Peace to accept a past-president's badge and to remain in the chair for the rest of the meeting. Mr. Peace next had the pleasant duty of presenting the senior vice-president's badge of office to Mr. G. R. Shotton, who had been proposed by Mr. John Gardom, with Mr. P. A. Russell, seconding. In seconding the proposal by Mr. N. P. Newman that Mr. D. A. Richards be junior vice-president, Mr. John Blakiston said that Mr. Richards was a man who was "always on the job" and ready to give his services at any time. He had twice been branch president of the Bristol & West of England branch of the Institute.

Amendments to Bye-laws

On the recommendation of Mr. John Bell, past-president—who has been chairman of a sub-committee considering for the last 18 months possible revision of the membership bye-laws of the Institute—a number of changes were put to the meeting, seconded by Mr. John Bailes, and carried. In essence, these changes comprise the following:—

Bye-law 3: (*a*) No change in the general conditions of membership and in the status and conditions of *Honorary Members.*

(*b*) *Members.* A man between the ages of 30 and 40 is not eligible for full membership if he belongs to an industry or profession only related to the foundry industry. He must in fact be a foundryman; even if he is 35 years old he must have held a position of eminence in the foundry industry for at least five years, unless he is otherwise qualified for associate membership. If an applicant is at least 40 years of age and holds or has held for at least five years a position of eminence in an industry ancillary to the foundry industry, he can then be a *member* of the Institute.

(*c*) *Associate Members.* Here the rules for admittance to this grade have been substantially changed and the position can best be summarized by showing the old and new rules as in Table 1.

(*d*) *Associates:* Here again the position is substantially changed as is made clear by Table 2.

(*e*) *Subscribing Firms:* The position here is little changed except that the nominee of the firm to represent it in Institute matters need only be qualified as an associate member—to be duly elected as such. Previously the firm's nominee had to be qualified for full membership.

Bye-law No. 6

Bye-law No. 6, regulating the procedure under which applications for membership are to be considered, now requires that all applications after consideration of a branch Council shall be submitted with that body's recommendation to the General Council for final consideration. Previously it appeared that a branch Council had power to

reject an application out of hand—although for several years this had never been done.

The bye-law regulating subscriptions payable by

Table 1—Old and New Rules for IBF Associate Members

PREVIOUS BYE-LAWS	NEW BYE-LAWS
Every applicant shall satisfy the Council *either* (*a*) that he is at least 21 years of age and has passed such qualifying examination as may be prescribed by the Council and at the time of his application is engaged in the foundry industry or in a related or kindred industry or profession, and has gained one of the outstanding awards connected with the foundry industry, such as the diploma of the Institute or the Buchanan silver medal; *or* (*b*) that he is at least 25 years of age and has passed such qualifying examination as may be prescribed by the Council and at the time of his application is engaged in the foundry industry or in a related or kindred industry or profession and has been so engaged for such time and in such capacity as the Council may consider necessary; *or* (*c*) that he is at least 27 years of age and has been regularly trained in some branch of foundry practice or holds or has held a position of responsibility in the industry for a period which in the opinion of the Council qualifies him for associate membership.	Every applicant shall satisfy the Council that he is at least 25 years of age and has passed such qualifying examination as may be prescribed by the Council and has been engaged for at least three years in some branch of the foundry industry and is so engaged at the time of his application; *or* (*b*) that he is at least 28 years of age and has been trained in some branch of the foundry industry and has held for at least three years a supervisory position in the foundry industry and is so engaged at the time of his application; *or* (*c*) that he is at least 30 years of age and has been trained in some branch of the foundry industry and has held for at least three years a supervisory position in the foundry industry and at the time of his application has been for at least five years engaged in an industry ancillary to the foundry industry and is so engaged at the time of his application; *or* (*d*) that he is at least 30 years of age and has been regularly trained for not less than four years in an industry ancillary to the foundry industry and at the time of his application has been engaged for at least five years in a supervisory technical capacity in a foundry and is so engaged at the time of his application.

Table 2—Old and New Rules for IBF Associates

PREVIOUS BYE-LAWS	NEW BYE-LAWS
Every applicant shall satisfy the Council either (*a*) that he is at least 21 years of age and an operative engaged in the foundry industry; *or* (*b*) that he is an apprentice or a person otherwise undergoing training in a foundry, patternshop, engineering establishment or metallurgical laboratory; *or* (*c*) that he is a student of foundry practice or metallurgy or engineering at a university or college or technical school recognised by the Council; *or* (*d*) that he is otherwise qualified for admission to the class of associate members but has not attained the age specified for such membership. An operative engaged in the foundry industry shall be entitled to remain in membership as an associate irrespective of age. No other person unless elected an associate prior to July 1, 1948, shall retain membership as an associate after attaining the age of 28 years	*Associates (under 23 years of age)* Every applicant shall satisfy the Council either (*a*) that he is at least 23 years of age and has been regularly trained in some branch of the foundry industry and has been engaged for at least five years in the foundry industry; *or* (*b*) that he is at least 23 years of age and has passed an examination recognized by the Council and is engaged in the foundry industry; *or* (*c*) that he is at least 25 years of age and has been regularly trained in an industry ancillary to the foundry industry and has been engaged for at least five years in a technical capacity in a foundry and is so engaged at the time of his application; *or* (*d*) that he is qualified for election to the grade or class of associate members but has not attained the age for such membership. *Associates (under 23 years of age)* (*a*) that he is an apprentice or person otherwise undergoing training in a patternshop, foundry, metallurgical laboratory or engineering establishment; *or* (*b*) that he is a student of patternmaking, foundry practice, metallurgy or engineering in a university or college or technical school recognized by the Council. No person shall return membership as an associate (under 23 years of age) after attaining the age of 23 years, unless he is undertaking a period of training of which three years have not been completed.

Conference personalities (continued): (from left to right)—(left) Sir Frederick Scopes delivering the Edward Williams lecture; (right) Sir William A. Worsley, J.P., and Lady Worsley with the president, Mr. C. H. Wilson, and Mrs. Wilson, and the Mayor and Mayoress of Scarborough, Councillor and Mrs. J. A. Kennedy, at the banquet on the Wednesday evening.

(From left to right): (top) Mr. J. W. Butler (assistant director, Council of Ironfoundry Associations), Mrs. Marshall, Mr. K. Marshall (director, CFA) and Mr. H. Morrogh (director, British Cast Iron Research Association); (bottom) Mr. D. M. Moir (past-president, Birmingham branch) and Mrs. Moir with Mr. and Mrs. J. Hird.

various grades of membership has been revised to take account of new grades as follow:

Members, associate members, associates and subscribing firms, shall pay an annual subscription according to the scale following: Member, £3 13s. 6d.; associate member, £2 12s. 6d.; associate 23 years of age or over, £2 2s.; under 23 years of age 10s. 6d.; subscribing firm, £10 10s. No subscription shall be payable by honorary secretaries of branches or sections during their tenure of office, or by a member or associate member who is the representative of a subscribing firm.

Other Changes:

To take cognisance of changes in the Institute's mode of publication of its *Proceedings* (and to avoid the supply of IBF literature to members who default in payment of subscriptions) bye-laws 11 and 34 have been slightly revised. In general a member now receives the publications of the Institute after payment of his current subscription and they are all made available to the associate grade of membership (under 23 years of age) until the Council may decide otherwise. Previously *associates* of the Institute were only entitled to the *Proceedings* on payment of an extra charge. Another proviso is that members re-elected after a lapse in membership may acquire back numbers of the *Proceedings* at their approximate cost to the Institute (always providing such copies are available, of course).

Explaining the above changes, it is clear that apart from minor modifications the alterations are concerned with increasing the status of membership. The proposed increased rate of subscription for associates (over 23 years of age)—who will henceforward represent an older group of members enjoying higher status—will ensure that this section of the membership contributes a sum more nearly approaching the cost of the services which it receives from the Institute, while the increase in the subscription of associates (under 23 years of age) is an adjustment partly to cover the decrease in the value of money since the subscription was fixed at 5s.

Council Members Elected

Following the re-election of auditors (J. & A. W. Sully & Company), the result of the ballot for five elected members of general Council was announced, those chosen being Dr. H. T. Angus, Mr. R. L. Handley, Mr. Barrington Hooper, Mr. A. Kirkham, and Mr. H. Paton Millar. These members will serve for the two-year period ending in June 1961.

In the concluding business of the annual general meeting, Mr. C. H. Wilson, the new president, proposed a vote of thanks to Mr. Peace who retired, and Mr. N. P. Newman seconded the proposition. Mr. Peace in his response coupled his appreciation of the support of members and officials with a special word of gratitude for his wife who had seconded him so ably during his year of office. He also voiced a special "thank-you" to Mr. Lambert the general secretary. Before the meeting closed Mr. Peace announced that a telegram had been despatched to His Royal Highness the Duke of Edinburgh (an honorary member of the Institute) sending him the warmest good wishes on the occasion of his birthday which happened to be on that day.

"FATHER TO SON"—TWELVE YEARS OF PROGRESS

After a break for coffee, members reassembled to hear the Presidential Address from Mr. C. H.

Wilson. Initially, the president reminded members that it was 12 years since his father, Mr. P. H. Wilson, had occupied the high office in the Institute. He thus took for his theme the twelve years of IBF progress 1947 to 1959. First he quoted extracts from his father's address in 1947 and said he hoped to show he was not mistaken in his faith in the "foundry" future expressed at that time. Dealing with membership, he mentioned the notable increase of from 264 to 1,139 associates of the Institute in the period, which represented the increase in interest of the younger generation of foundrymen.

Expressing an opinion at this point, Mr. Wilson said he thought there was currently increased scope in the foundries of the Commonwealth in the future, and work should proceed in adopting the best possible relationship with UK foundry workers, together with more interchange between UK members and those in the Commonwealth. As examples of this increasing contact he mentioned last year's successful Indian Foundry Congress and the pending voyage of Mr. E. Longden to Australia to give the first Tom Makemson memorial lecture to that branch when it celebrates its coming of age as an organization.

Dealing with domestic matters, Mr. Wilson referred to the IBF conference, and the reports presented, as a "shop window" for UK foundrymen. He also dealt briefly with the National Works Visit Day annual function (acknowledging the Institute's gratitude to the companies who acted as hosts) and to the work of the Technical Council, for example, in the publication of its highly-esteemed volume of "Typical Microstructures of Cast Metals."

Coming to his main theme—education—the president mentioned that liaison had commenced as long ago as 1928 between the Institute and the City & Guilds organization. He then quoted the annual record of candidates presenting themselves at the foundry practice and patternmaking examinations of that body, and reported successes since then, saying this was impressive but not good enough. He also dealt with other educational facilities open to foundrymen in this country ending with reference to the National Foundry College where 186 diplomas had been granted, to date. (Here Mr. Wilson said that just as he thought he was the first president to follow a father who had also held that office, he also thought he was the first president to hold a diploma of the National Foundry College!) Thirty students were now taking the second part of the College course and the Governors were now considering the setting up of a further academically advanced course, but more support of a practical nature was needed from the industry.

Before concluding his remarks on education, the president mentioned also the post-graduate course instituted recently at Birmingham University, the IBF Foremen's Training Courses, the National Foundry Craft Training Centre and apprentice competitions, saying that there was a need for a joint committee of all interested bodies to inquire into training in all aspects of the foundry industry and to make recommendations for future rationalized procedure.

To close his address, Mr. Wilson said that though much had been done in these last 12 years, there was no room for complacency and the future would need the active support of all members in furthering the aims of the Institute.

In proposing a vote of thanks to Mr. Wilson for his address, Mr. Peace expressed appreciation, especially, for this new stimulus on the educational side. Dr. A. B. Everest seconded this proposition (which was carried with applause), laying stress on the desirability for increased international exchanges between foundrymen.

To conclude the morning's programme, Sir Frederick Scopes gave the Edward Williams Lecture, choosing for his subject "Thoughts on the Future of the Ironfoundry Industry" (which it is hoped to abstract in a future issue of the JOURNAL). He, too, drew attention to the National Foundry College proposals for the new high grade course, which, he said, it was hoped to start in September, 1960.

(To be continued)

English Electric gets US Dam Contract

The $6,500,000 (£2,300,000) Big Bend dam contract for the supply of hydraulic turbines for the major South Dakota project has been awarded to the English Electric Company, Limited. English Electric underbid the nearest US domestic manufacturer—Baldwin-Lima-Hamilton Company—by 30 per cent. The decision was made before the Office of Civil and Defence Mobilization found against the domestic industry's plea for a ban on imports of hydraulic turbines and generators, transformers, and circuit breakers on the grounds of national security.

The award leaves the result of one other major English Electric low bid to be determined. This is the $4,500,000 bid for the supply of water-wheel generators to the Barkley hydro-electric project in Kentucky. The Army Corps of Engineers has still to announce a decision on the tenders which were opened a month before those for Big Bend.

British Machinery for Rumanian Tyre Factory

Rustyfa, Limited, the British consortium, has won a contract for the design and supply of machinery and equipment for a large tyre factory to be built in Rumania. The project, in which Dunlop Advisory Services, Limited, is acting as consultants, involves expenditure in the UK of more than £7,500,000. The factory will be able to produce annually 1,000,000 tyres and tubes for trucks, buses, and passenger cars, 500,000 for motor cycles and scooters, and 1,500,000 for bicycles.

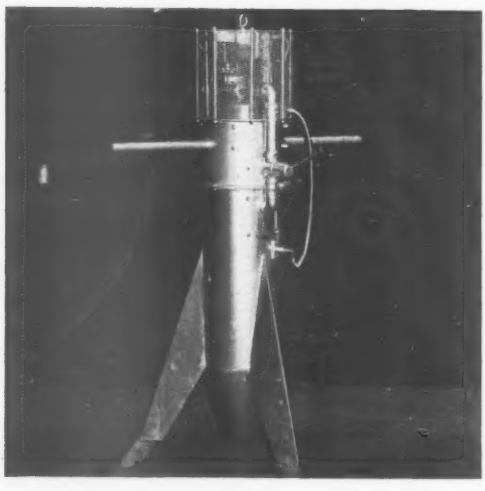
Rustyfa is already supplying machinery and equipment for a large tyre factory at Dniepropetrovsk, in the USSR. The member-companies of the consortium are:—David Bridge & Company, Limited, Crompton Parkinson, Limited, Lancashire Dynamo Holdings, Limited, Mather & Platt, Limited, Francis Shaw & Company, Limited, and Simon Handling Engineers, Limited.

Equipment & Supplies

Mould Dryer

A new type of gas-fired hot-air unit (the Axialjet-M), for drying moulds *in situ*, has been introduced by Modern Furnaces & Stoves, Limited, Booth Street, Handsworth, Birmingham, 21, who are manufacturing them under licence from the North Western Gas Board. The unit (Fig. 1) has fully-automatic spark ignition, electric-failure protection and push-button control. Its total weight, including the axial fan, is 140 lb., which makes it useful in foundries when no crane is available, since it can be easily carried by two men. The unit operates equally well in both vertical and horizontal planes—the maximum heat output is instantaneously available, and the temperature of the discharged hot gases readily controlled. In operation, the casing (with the exception of the nozzle) is kept cool by a fan blowing cold air through the annular space between the combustion chamber and the outer casing. The unit is able to deliver 400 cub. ft. of hot air per min. at temperatures up to 400 deg. C., and maximum gas consumption is 400,000 B.T.U's per hr. (approximately 850 cub. ft. of town's gas).

FIG. 1.—*Gas-fired hot-air unit for drying moulds, introduced by Modern Furnace & Stoves, Limited, of Birmingham.*



Ultrasonic Flaw-detector

In the ultrasonic non-destructive inspection field, Ultrasonoscope Company (London), Limited, Sudbourne Road, Brixton Hill, London, S.W.2, have added a new model (the Mark 2) to their range of flaw-detectors.

This portable general-purpose flaw-detector (Fig. 1) is claimed to have fast time-base speeds and high trace brightness, combined with a rectified or unrectified trace display to enable a comprehensive study of flaw echo shape.

Its operational frequency range of ½ to 10 mc/s, and maximum depth range of 20 ft. (in steel), extends the possible application range over a very wide number of non-destructive inspection problems. A few of the many applications in the engineering, marine, welding and nuclear energy fields include: the testing of lead shielding blocks; graphite quality control; heavy-section weld inspection, and the checking of steel plate for lamination.

FIG. 2.—*Ultrasonic flaw-detector developed by Ultrasonoscope Company (London), Limited, of London, S.W.2.*

Principles of Operation

The Mark 2 instrument makes use of the principle of echo sounding, using vibrations beyond the sonic range. These vibrations are produced by a barium titanate or lead zirconate transducer, designed to operate most efficiently at one frequency, mounted in a probe which varies according to the type of application. On single-probe working the same transducer both transmits the vibration and receives the echo, converting the echo back into an electrical impulse.

A 5-in. dia. cathode ray tube shows the condition of the material being tested, a reflected wave giving a vertical deflection on the cathode ray tube—the distance that this wave has travelled is indicated by the horizontal position of the deflection along the time base. The speed of travel of the time base is continuously variable by means of a coarse and fine control, so that its total length may be made to correspond to echo distances of from 1 in. to 20 ft. A device is incorporated to enable the operator to select any portion of the display and expand it across the full time-base length. Optional "B" Scan presentation is available at the turn of a switch.

Specification

Specification summary is as follows: frequency range, ½ to 10 mc/s; time-base range, 1 in. to 20 ft. (in steel); dimensions, 9¾ by 17½ by 13 in.; weight, 38 lb.; electrical supply, 110 to 250 v., 50∞, and consumption, 120 w.

E. ELLIOTT, LIMITED, 315, Summer Lane, Birmingham, 19, announce three new types of safety goggles. These goggles incorporate "Celastoid" windows, which are claimed to be tough, crystal clear, shatterproof and splinterproof.

Survey of the Hallsworth Automatic Moulding System*

By H. B. Hallsworth, R. D. Mills and Peter Spear

This survey describes a new approach to an old industrial problem—that of producing medium or large quantities of accurate ferrous and non-ferrous sand-castings of a size that may be accommodated without difficulty in an assembly moulding box of dimensions 12 by 9 by 5 in.

In the Hallsworth automatic moulding system a moulding box with dimensions 12 by 9 by 5 in. is used. In the conventional foundry it is usual to use a larger box than this, moulded by hand with, possibly, machine squeezing and stripping followed by hand assembly and pouring under traditional foundry conditions, which have not changed, apart from the health aspect, in many decades. Most of the improved methods in European practice, especially in the production of light castings, appear to be simple extensions of known conventional methods. According to Timmins[1] "Broadly speaking, the two root causes of inefficiencies in the moulding department are, first, the lack or limitations of floor space, and secondly, the fact that moulders are often called upon to carry out subsidiary duties of pouring, knocking out and sand conditioning. . . ."

The Hallsworth system employs the principle of using relatively small, easily handled, moulding boxes with completely automatic equipment as and where necessary, but still retaining the human element if justified by economics. At the same time the system is flexible, to facilitate the use of a number of patternplates within a single shift without any more adjustments than can be undertaken by a semi-skilled mechanic. The arrangement is centred on an automatic moulding-machine, which automatically sprays, charges with sand, "edge tucks," squeezes, removes surplus sand, strips and deposits the mould on to a conveyor track ready for assembly. This entire sequence is carried out on a four-station machine served by a number of ancillary appliances keyed to its operational sequence. A general view of the machine is given in Fig. 1. The moulding table rotates between the base and head castings which in principle, from the structural viewpoint, present a self-contained force system.

AUTOMATIC MOULDING MACHINE

Sequence of Operations

Station 1

The machine consists of four stations, and a rotary table which automatically conveys the half-box and pattern from station to station. At the first station the operator, after locating the box part on the patternplate, pulls down the vertically-positioned hinged sand-allowance frame on to the box part.

Station 2

The table indexes to station 2 to receive sand, and, in its arc of movement, is subjected to a spray of parting fluid. A semi-rotary hopper turns through 180 deg., discharging sand into the box part mounted on the table. A frame fitted to the sand chute then moves downwards compressing the sand round the edge of the mould (*i.e.*, "edge tucks").

Station 3

The table then indexes to station 3 for the main squeeze operation. During this movement the sand-filled box part passes under an adjustable sand-levelling device, which strikes off surplus sand (*i.e.*, the "static strickle bar").

Station 4

Following the main squeezing operation the table indexes to station 4. During the movement from station 3 to station 4 the hinged sand-allowance frame is restored to the vertical position to enable the scraper bar to strickle the mould. The patternplate is vibrated, and the mould stripped to be received by the take-off arms, which have by now moved into position.

Completion of Cycle

The cycle is completed when the take-off mechanism places the half mould face upwards on to a moving belt conveyor. It will be appreciated that all the operations described take place simultaneously, and that four boxes and patterns are in use simultaneously.

Functions of Operator

It is necessary for an operator to be present, but his sole functions are to: (1) Visually examine the patternplate, and clean it with a compressed-air gun if necessary; (2) position the box part, and (3) bring down the sand-allowance frame. None of these operations is fatiguing to any great extent, and all the essential moulding operations are carried out automatically.

Operation and Control

Basic Principles

The basic principle is to use the table indexing mechanism as the master control, steering the

* A short description of this system was given in the April 25, 1956, issue of the JOURNAL.

† Mr. Hallsworth is development director of Platt Malleable Castings, Limited, and was formerly manager of the foundry equipment department at Rubery Owen & Company, Limited. Mr. Mills is the present manager of this department, and Mr. Spear is director of research.

operating cycle and thus ensuring that no overlapping of operations can occur. Concise control of operation speed is obtained, where necessary, by mechanically linking a hydraulic dashpot system to a pneumatic power system. Motive power for table rotation is supplied by a pneumatic cylinder, its speed being controlled by a hydraulic cylinder. Overall cycle time is controlled electrically by process timers. Individual cylinder speed is controlled pneumatically by speed-control valves.

Movement

Motion is transferred from the index cylinder to the rotary table by a pawl and indexing cam. The pawl is mounted in a carrier which oscillates around the indexing cam, thus imparting the necessary interrupted rotary motion. Movement is under the control of a hydraulic cylinder, thus ensuring that starting and stopping of the table is reasonably shockless. During the power stroke of the index cylinder the pawl is in the engaged position, so that motion is carried directly from the cylinder to the machine table *via* a pair of indexing plates and a vertical shaft. The shaft is mounted in top and bottom bearings, and has the pattern table keyed to it. Adjustable cams are attached to the indexing plates, which control in sequence the primary ancillary operations which are performed when the table is in motion. The operations which are undertaken when the table is still are under the direct control of a pilot valve, which is actuated from a cam positioned on the mould take-off arms.

Emergency Stop Control

An emergency foot-operated solenoid stop control is fitted externally to the base casting. Depression of the control cuts off the supply of air to the machine and unloads all cylinders, thus bringing all motion to a standstill. As the corollary of this the indexing mechanism has no load, and the table may be moved freely by hand.

Sand-allowance Frame

Also fitted to the table driving shaft is an assembly of four hinged frames, so sprung that they occupy either vertical or horizontal positions. The frames are vertical during loading and unloading, and horizontal when "edge tucking" and squeezing. At the end of the cycle of mould production the frame is vertical, and one of the operator's functions after placing a new moulding box in position is to lower the frame, where it is held down horizontally by over-centred springs. Between the

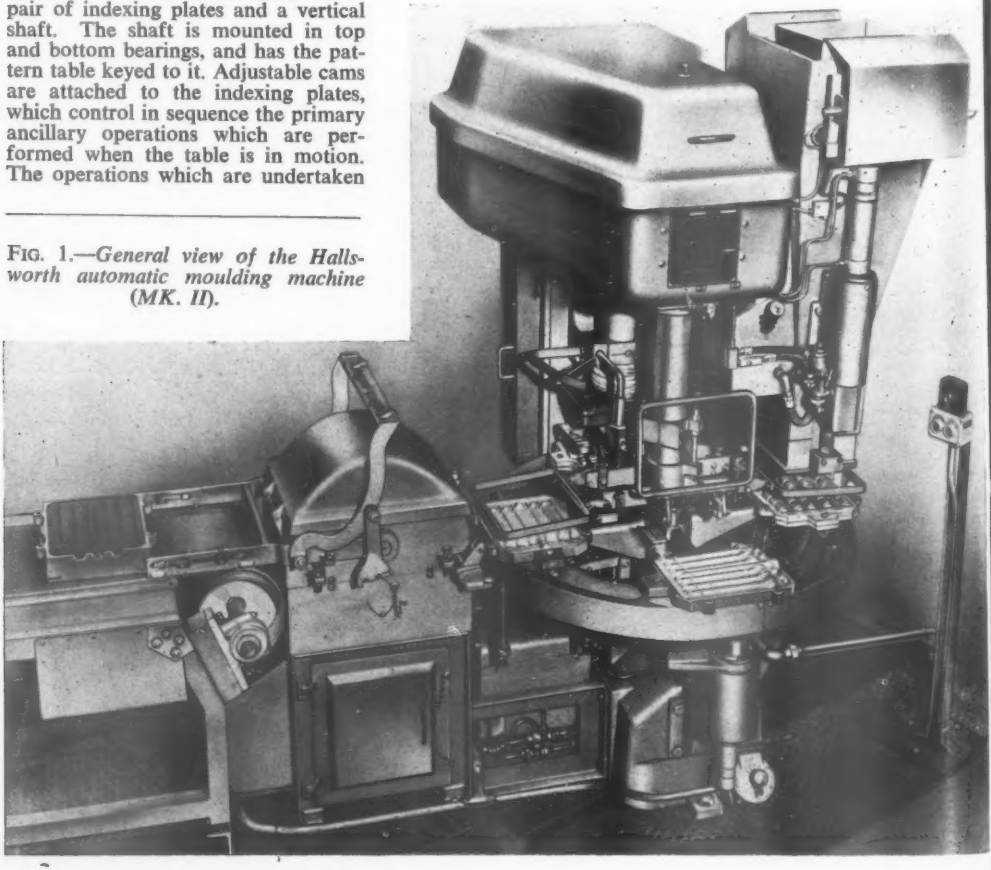


FIG. 1.—*General view of the Hallsworth automatic moulding machine (MK. II).*

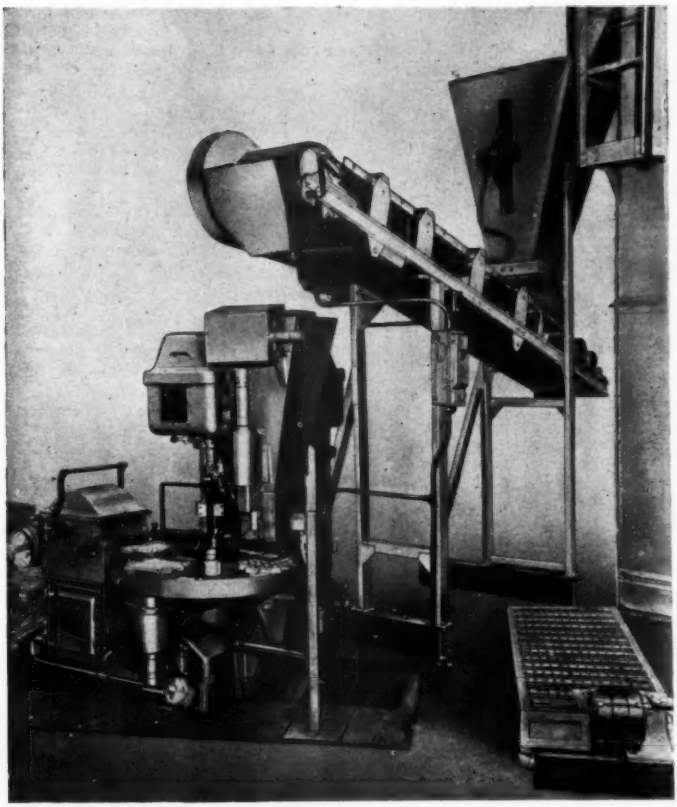


FIG. 2.—*Moulding machine and sand feed conveyor. The moulding-machine sand-chute is immediately below the sand feed conveyor. In the right-hand corner of the photograph the magnetic separator guard can be seen.*

squeezing and mould-ejection stations (3 and 4) a projection at the back of the frame passes under a positioned wheel, which forces the frame into the vertical position. The purpose of the frame is to contain surplus sand for ramming requirements, and to prevent spillage during these operations.

Sand-metering and "Edge Tucking"

A steel chute is fitted to the moulding machine (see Fig. 2). At the top of this chute is mounted a double-sided hopper, which can be seen in detail in Fig. 3. This hopper consists of two opposed box-like compartments, one of which is always in a position to receive sand from the sand belt-conveyor working with the reservoir hopper (shown in Fig. 2). The double-sided semi-rotary hopper is mounted horizontally on two male bearings attached to a square shaft. At each indexed operation the hopper turns through 180 deg. in a clockwise or anti-clockwise direction, emptying the sand-filled compartment. The amount of sand entering the hopper between two indexing operations is controlled by adjustment of the gate on the reservoir hopper, which controls the level of sand on the belt. The steel chute is fitted with a movable frame at its discharge outlet. This frame has four "keep" sides, the leading edges of which are flanged to squeeze the sand at the edge of the moulding box and thus perform the function of "edge tucking." Vertical movement of the "edge tucking" frame is effected by two double-acting pneumatic cylinders. The overall dimensions of the frame provide a working clearance between the mould and the frame, thus enabling the squeezing force to go into the body of the sand.

Main Squeeze

The main squeeze cylinder is accommodated within the head casting, and operates vertically. The piston rod carries a serrated press-plate of suitable dimensions to allow entry into the sand frame when squeezing. In order to accommodate the heavy thrust which takes place a pair of pads are positioned on the underside of the table, designed to contact on a pair of tapered support-rollers fitted to the base casting when a load is being applied, thus stopping table deflection and limiting main bearing wear. Any variation of pressure required can be obtained by adjustment of an easily accessible pressure-control on the air-line.

Mould Stripping

The lifting mechanism consists of an aluminium casting, on which are mounted four ejector pins positioned to locate at the corners of the box. Vertical movement of the unit is obtained by a specially designed heavy-duty air-cylinder, to which two steadying hydraulic cylinders are coupled mechanically. The mounting structure is a bracket cantilevered from the base casting. Before the four pins are in contact with the box, a standard pneumatic vibrator comes into action on the underside of the patternplate and continues during lifting, thus preventing sand sticking to the pattern and facilitating a clean stripping action.

Mould Take-off

The mould take-off (see Fig. 4) consists of two steel lifting-arms, semi-rotatably mounted in self-

Hallsworth Automatic Moulding System

aligning roller-bearings, located on a steel frame. The arms are actuated by two trunnion-mounted cylinders, positioned in parallel—an air cylinder to supply motive power, and a hydraulic cylinder to control speed. The linear motion of the cylinders is

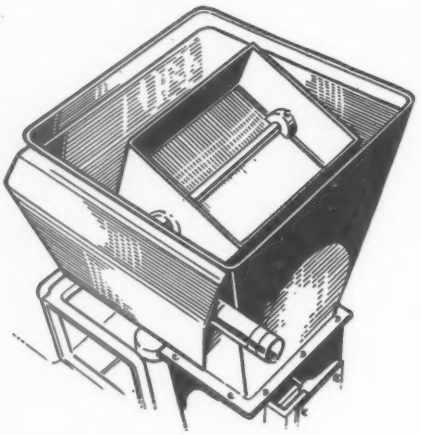


FIG. 3.—*Detailed view of the sand-metering hopper which is fitted to the moulding machine.*

transposed to angular movement by a rocker arm connected to the cylinder nose ends. The two lifting arms are fitted with spring-loaded catches, which engage corresponding projections on the moulding box. This method of attachment prevents any movement of the half mould relative to the arms, during its transfer from the machine to the coring conveyor, and yet allows it to be withdrawn smoothly by the conveyor.

Scraper

The scraper mechanism has been designed to reproduce mechanically what is normally a hand operation. During this operation, either by hand or by machine, excess sand is removed from the mould back by the cutting action of the scraper bar or blade. It is essential that, after the scraping operation, the level of sand should not protrude above the top edge of the moulding box. A frame is fitted over, and pivoted to, the mould take-off lifting-arms. In the moulding-box discharge position the scraper rests on stops, with the leading edge facing towards station 4. A special adjustable steel cutting blade is attached to the leading edge of the frame. Rollers are set flush either side of this scraper blade, designed to run along the opposing faces of the moulding-box sides. When the take-off arms move to engage a mould they are preceded by the scraper frame, and the semi-rotary movement of the arms is converted into a linear movement of the scraper frame. Thus the scraper blade passes across the moulding box cutting away excess sand (see Fig. 5).

MOULD CONVEYOR

Mould Loading

To ensure efficient labour utilization, and for inspection purposes, the completed mould is loaded manually into the rotary conveyor shown in Fig. 6. The operator effort needed is slight, since a slip is provided at the end of the coring conveyor, down which the boxes slide into the next pallet. From this point the mould is handled mechanically.

Mould Clamping

The mould-clamping mechanisms or pallets are carried on the outer ring of the rotary track. Each unit consists of a base with a spring-loaded top, and is mounted in pivots about the bottom pallet between two specially designed upright supports. In each pair of pivot members two links are fitted loosely, one each side of the mechanism, and connected together with a steel bar which projects a short distance through each link. This bar is provided with a pressure roller in the centre. A roller is fitted to the underside of the mechanism which engages with a cam rail controlling the angle of tilt. When the mechanism is tilted

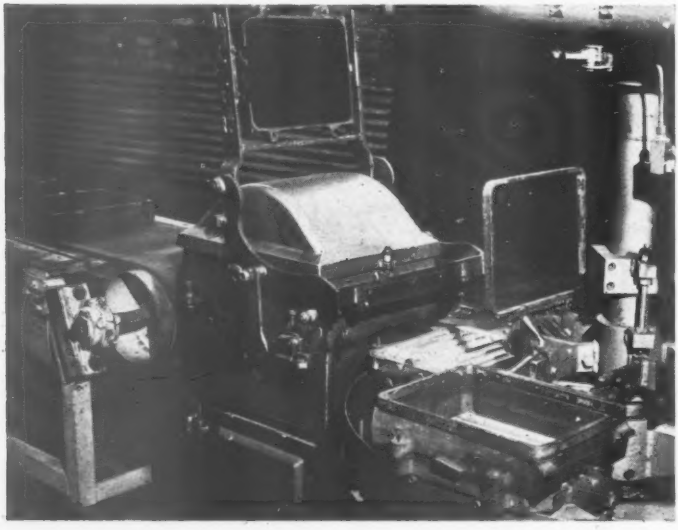


FIG. 4.—*View of the mould take-off station. The half mould has engaged in the take-off arms and is being transported towards the coring conveyor.*

clamping is effected by the projecting ends of the link tie-bar interfering with the top of the two vertical supports, causing the pressure roller to force the top plate downwards on to the mould. When the mechanism is restored to the horizontal position, again by the control of the roller engaging with the cam rail, the clamping pressure is relieved, which enables the springs to exert an upward thrust to the top plate and so facilitate the removal of the mould. The pallet mechanism is so designed that any unevenness of the sand face does not interfere with the ultimate contact of both box parts, and the mechanism is aligned essentially about the major pouring-axis of the box. The clamping arrangements have been designed to resist any ferrostatic pressure likely to be encountered, and thus prevent any possibility of metal leakage.

POURING AND SHAKE-OUT

To pour the moulds in the vertical position, it is advisable that the ladle lip be kept as close as possible to the "downgate," and the ladle height adjusted about its lip during the pouring of the metal. It is also essential, bearing in mind the method of approach to the design of the system, that the heavy fatigue associated with this operation be eliminated. Consequently the simple mechanism seen in Fig. 6 has been evolved.

Swinging-arm Ladle Support

Standard foundry ladles are used but the carrying handle is modified. The ladle and carrying handle are supported in a self-adjusting cradle suspended from a swinging arm, so that in plan the ladle moves around an arc, the centre of which coincides with the centre of the rotary track. The cradle consists of two hooks, and is supported by a compression spring working in a housing which, in addition to catering for the rotary and vertical movements, also allows the ladle to be moved inwards or outwards as desired. The arm from which the mechanism is suspended rotates about the centre of the mould conveyor, and has a balance weight fitted at the opposite end to facilitate rotation and eliminate operator fatigue. The ladle handle is provided with two trunnions, one on each side of the ladle, which pivot within the two hooks of the cradle. The cradle support spring is loaded to equal the combined weight of the cradle handle assembly, and consequently it adjusts its height as the metal poured reduces the total weight of the assembly.

Solidification of the Castings

Following the casting of the mould, the track continues to take the pallet round with no change in angle. During this period the cast metal is solidifying, and steps have been taken to ensure that no vibration occurs. The speed of the track has to be controlled to enable the casting to solidify completely, and this in turn controls the whole clamping, pouring and shake-out cycle. The track is wire-rope driven from a variable-speed gearbox and electric motor. After the necessary cooling period the poured moulds are automatically restored to the horizontal position, and unclamped ready for removal at the shake-out.

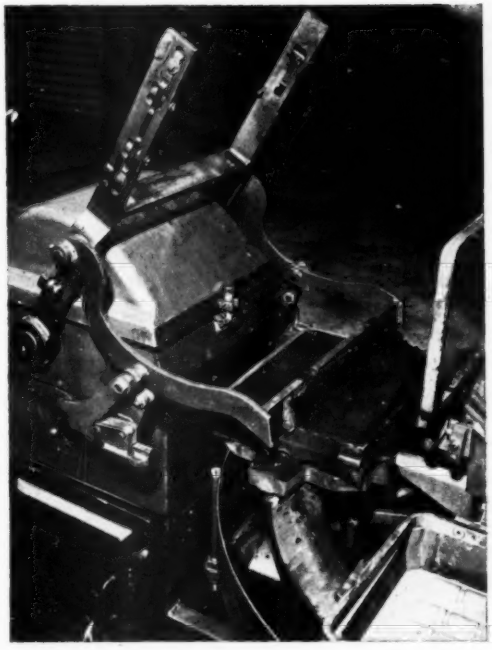


FIG. 5.—*The scraper frame of the moulding machine is seen cutting away surplus sand from the mould. Upon completion of its stroke the mould lift operates, and the take-off arms engage on the mould.*

Shake-out

The shake-out is a conventional vibratory frame-type machine fixed to the foundry floor and positioned over an underground sand-return conveyor. The box parts are placed on the gravity roller conveyor and return to the moulding machine to complete the cycle.

ECONOMICS

Production Rate

The moulding machine described in this article is capable of producing at least 240 completed moulds per hr. The speed of the circular clamping-and-pouring conveyor track is variable to give a cooling period of from 4 to 8 min., depending on the output from the moulding machine, the type of alloy, and size of the castings. There are instances, however, where it is possible to reduce the cooling period considerably, for example where very small light castings are being produced.

Difficulties of Comparison

A foundryman considering the replacement of manual or semi-mechanized methods by a unit of this type would naturally use the results obtained in his own foundry as a basis of comparison. In general terms, smaller foundries find it difficult to

obtain an accurate cost assessment, as manual moulding includes several ancillary operations, the performance of which may be carried out in some instances by several operators and in other circumstances by the moulder himself. Such operations include the supply and preparation of sand, positioning of cores, box collection, metal pouring and knock-out of casting, etc. For this reason, a direct comparison of the two methods is difficult, as any cost figures chosen for manual operation would not cover all cases likely to be encountered.

ing 5 lb. of castings (this normally implies a larger box than used on the automatic machine—say 18 by 12 by 5 in.—which represents conventional practice), one operator would have to produce 200 boxes per day in order to approach the conservative estimate of the output of the automatic machine. In addition he would have to carry out the attendant operations himself, including sand preparation, metal pouring and all material movement. A rate of production of this order is almost impossible, and even taking into account the variation from foundry to foundry, it might be deduced that the production per operator increases three to four

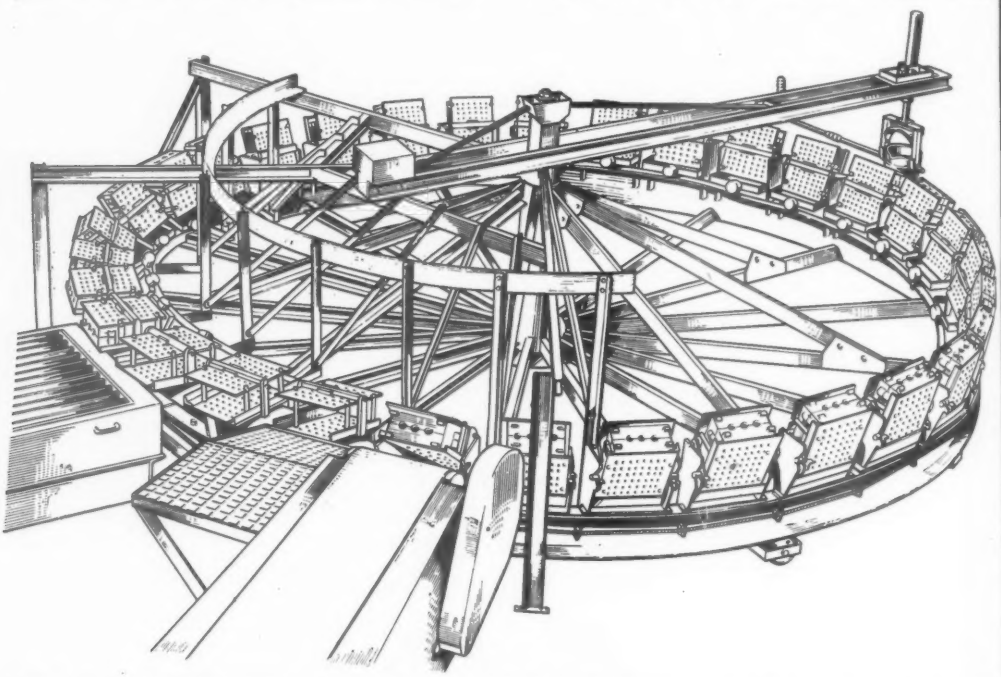


FIG. 6.—*View of the rotary casting conveyor in the Hallsworth system, showing the various positions of the mould pallets at different points on the circumference.*

Potentialities of the Unit

Some idea of the potentialities of the unit may be obtained by considering that, with a five-man team operating the unit, a rate of at least 240 completed moulds per hr. may be obtained with an output per man per day of the order of, say, 1,000 lb. This is a tentative figure assuming that fairly light castings of the order of 2½ lb. per box are being produced. (In a number of cases on working installations the casting yield per box has been as high as 8 lb., this excluding, of course, the weight of the running system.)

Drawbacks of Manual Moulding

In terms of manual operation, using a box hold-

times when using a unit of this type. The economic benefit of even trebling the output per man under present conditions of high labour charges, and the difficulty of obtaining skilled men, needs no emphasis and gives some idea of the rapidity with which the initial capital outlay might be recovered.

CONCLUSIONS

(1) An attempt has been made to solve the problem of economic use of labour by:—

(*a*) The replacement of operations involving a high degree of operator fatigue by mechanization;

(*b*) the combination of hand-loading of empty boxes with supervision on an automatic mould-

ing machine, and

(*c*) the combination of mould inspection, coring up, closing-over and loading on an automatic rotary mould-conveyor.

(2) The problem of expanding a moulding machine into a closely integrated moulding system has been overcome by using the optimum amount of mechanization on each element of the three major cycles of box, sand and metal. These cycles are closely interlocked by means of appropriate conveyors.

(3) The problem of synchronizing the various steps involved in mould preparation has been solved on the moulding machine by the use of the self-locking indexing mechanism, and the sequence timing of each operation from a master control.

(4) The problems of handling moulds prior to casting, setting up, clamping for pouring, and extraction of finished castings, have been solved by the use of the rotary mould conveyor.

(5) The need for high efficiency in the mechanical and manual handling of moulding boxes has been achieved by the use of a small, fast-moving box.

(6) Flexibility has been achieved in that, whilst the system is complete in itself, the basic units of moulding machine and rotary conveyor can be served by an outside sand and metal supply, where such capacity is already in existence.

REFERENCE

[1] Timmins, A. A. "Suggestions for Simplification in Foundry Operations." BCIRA *Journal*, October, 1954, pp. 441-446.

Metallurgical Abstract

Centrifugal Castings. J. L. EVERHART. (" Materials in Design Engineering." 1958. Vol. 48; No. 2; pp. 89-93). The nature of the centrifugal-casting process assures a dense homogeneous-cast structure free from porosity. As the metal solidifies in a spinning mould under centrifugal force, the metal tends to be forced against the mould wall while impurities are forced toward the inside of the tube.

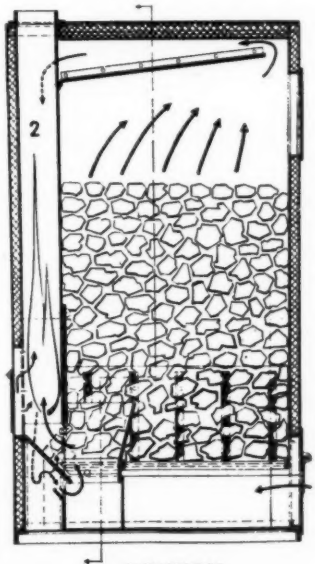
Regardless of alloy content, the tensile properties of irons cast centrifugally are reported to be higher than those of static castings produced from the same heat. The relatively low pouring temperatures and good fluidity of the common grades of grey iron make them readily adaptable to the process. Centrifugal castings are produced from carbon steels having carbon contents ranging from 0.05 to 0.90 per cent. Most of the AISI stainless and heat-resisting grades can be cast centrifugally. An advantage of the process is its use in producing tubes and cylinders from alloy compositions that are difficult to pierce and to forge or roll.

The excellent ductility resulting in the stainless-steel alloys from centrifugal casting makes it possible to reduce the rough-cast tubes to smaller-diameter tubing by hot or cold-working methods. With stainless-steel compositions, tubing over 8 in. dia. is competitive with forged and rolled tubing, but the small-diameter tubing is more expensive. Centrifugal castings with one metal on the outside and another on the inside are in commercial production.

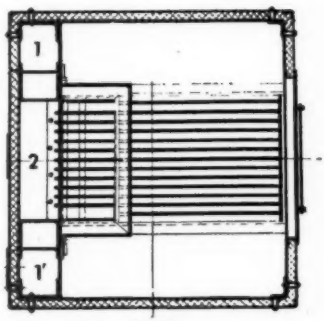
Escombe System Applied to Domestic Heating

The Escombe system (economic smokeless combustion) was invented by Mr. Sven Wernheim, one of the two designers of the original Aga cooker. The system was recently demonstrated to the Press at the Training Centre of the Coal Utilisation Council, using enclosed stoves made by the Hammond Lane Company, of Dublin. One stove was burning bituminous coal, and certainly operated smokelessly, whilst a second one was available for the inspection of the internal system of flues. The accompanying illustration shows how the primary products of combustion are passed back through the incandescent bed of fuel and reduced to combustible gases (carbon dioxide and hydrogen), which are in turn burned in a built-in gas-combustion chamber.

It should be understood that the firm, Licentia Ekeman & Brundin, Karlavagen 29, Stockholm 0, Sweden, holders of the rights, do not intend to manufacture in UK, but to issue licences to makers of similar products.



ELEVATION



PLAN

The gases evolved during the primary combustion (carbon dioxide, carbon monoxide, steam and small carbon particles, etc.) which in conventional ovens are carried away through the chimney, are in this new system driven back down through the two return channels (1 and 1') at the rear wall of the oven, and are compelled to pass through the glowing fuel mass. In this way they are reduced to combustible gases (carbon monoxide and hydrogen), which in turn are burned in the oven's built-in gas combustion channel (2), where secondary air is added. Thus the system ensures complete and smokeless combustion.

Commonwealth Standards Conference

Seven countries, Australia, India, New Zealand, Pakistan, South Africa, Canada and the UK will be represented at the fourth Commonwealth Standards Conference to be held this year in Ottawa, Canada, from August 26 to September 4. An observer from the Institute for Research and Standards in Dublin will also be present. The conference will include a general session and three main technical sessions on steel, air receivers and cranes.

Amongst the subjects to be considered at the general session is certification marking, with particular reference to the principles of quality control to be included in standards and the schemes of supervision related to certification marks. Discussion of the problems of inch and metric dimensions in standards will be particularly concerned with India's position *vis-a-vis* the rest of the Commonwealth, with conversion between the inch and metric systems, and the showing of equivalents in Commonwealth standards.

Reports on a number of aspects of the British Standards Institution's work such as modular co-ordination and consumer goods activities will also be discussed. Progress reports on the technical subjects considered at the last Commonwealth conference at Delhi in 1957 (safety of domestic electrical appliances, cables and electrical equipment of machine tools) will be presented and future work in these fields as well as for new projects will be planned. The BSI team for this general session will be led by its director, Mr. H. A. R. Binney.

Technical Sessions

Discussion at the technical session on steel will include the co-ordination and rationalization of carbon-alloy and special steels. The delegates from this country to this session will be led by Mr. E. W. Senior (British Iron and Steel Federation) and will comprise Mr. W. Gillies (Lanarkshire Steel Company, Limited), Mr. W. L. Hewlett (Iron and Steel Board) and Mr. S. Richards (Appleby-Frodingham Steel Company).

At the other two technical sessions, three main types of air receiver will be considered—welded steel, pressure containers for paint, and solid drawn steel. Five British Standards have been tabled by BSI for use as a basis for the discussions. At the session on cranes, methods of expressing load ratings and the alignment of stability requirements, together with methods of calculating stresses will be the principal topics. The use, safety requirements and construction of cranes will also be reviewed.

At the former session the UK delegation will comprise Mr. H. Entwistle (H.M. Factory Inspectorate, Ministry of Labour and National Service), Mr. F. S. Marsh and Mr. C. Twigg (Chesterfield Tube Company, Limited), Dr. E. Fuchs (Imperial Chemical Industries, Limited), Mr. R. J. S. MacPherson (Association Offices Technical Committee) and Mr. P. C. Bevis (British Compressed Air Society). Mr. J. Baker (Clyde Crane and Booth, Limited), Mr. W. Reside (Sir William Arrol & Company, Limited), Mr. H. Entwistle and Mr. R. J. S. MacPherson will be present for the discussions on cranes.

LOBNITZ & COMPANY, LIMITED, Renfrew, have received an order for a dredger from the British Transport Commission valued at £250,000.

"Oversea Service"

"Oversea Service" is the title of a non-profit-making company, whose basic activity is to instruct people prior to their taking jobs overseas, especially Africa and the Far East, as to the conditions they will encounter and the behaviour expected of them during their stay abroad. Most of the courses are held at Moor Park College, Farnham, Surrey—the headquarters of Oversea Service—and others are held at Dunford College, Midhurst, Sussex. The courses usually last a week and students are encouraged to take their wives or fiancées with them. The Board of Governors and the Advisory Council is constituted of clerics, industrialists, and members of the House of Lords. Students are drawn from the Civil Service, banks, and large industrial concerns, and, since the inception of the organization in 1953, 1,376 have taken courses.

The writer deems the system to be admirable. To his knowledge, there is more than one case on record where at considerable expense a man has been sent abroad to take up an appointment, and he has visited the foundry for but a single day; then, finding conditions intolerable, he has returned home almost immediately. If by the sponsoring firm spending, say, 25 guineas for a week's course, this kind of happening can be prevented, the work of "Oversea Service" merits support.

In the case of the foundry industry where jobs abroad are concerned, it is usually a question of an individual answering an advertisement and accepting an appointment. In such event it is suggested that before entering the countries covered by these courses, the applicant should ask the employer to pay for his attendance at one of these courses of study in order to have at least a background knowledge of the new environment. The aim of the Service is that people going abroad should be "ambassadors" of western Christian culture.

Russian Production in Heavy Industries

According to the Central Statistical Board of the USSR Council of Ministers, the country's heavy industries have overfulfilled the production plan for the first six months of 1959 of many major items. Output increases over the first half of 1958 are: pig-iron, 1,715,000 tons; steel, 2,345,000 tons; and rolled metal, 1,670,000 tons. In the first half of 1959, Soviet industry produced 21,000,000 tons of pig-iron, 29,300,000 tons of steel, 23,100,000 tons of rolled metal, 2,500,000 tons of steel tubes, 46,300,000 tons of iron ore, 93,400 tons of metallurgical equipment, 73,100 metal-cutting machine-tools, 241,500 motor vehicles, 106,000 tractors, and 26,400 grain harvester combines.

During the period under review, the following projects were put into service: an open-hearth furnace and a large-section rolling mill at the Nizhny Tagil Steel Works (Urals), an open-hearth furnace and a blooming mill at the Cherepovets Steel Works (north-west of the Russian Federation), a rolling mill at the Dzerjinsky Works at Dnieprodzerjinsk (Ukraine), and a slabbing mill, the biggest of its kind in the USSR and, it is claimed, in Europe, at the Magnitogorsk Steel Works (Urals).

Electrical Engineers' Exhibition

The ninth Electrical Engineers' Exhibition, sponsored by the Association of Supervising Electrical Engineers, will be held at Earls Court, London, from April 5 to 9, 1960. The organizers are Electrical Engineers A.S.E.E. Exhibition, Limited, Museum House, Museum Street, London, W.C.1.

Exhibition Aftermath

(*Continued from page 9*)

"Nightmare and Reality"—An Old Stager's Views . . .

. . . *by "Jacques"*

To an old "stager" with fifty-odd years of practical and executive foundry experience behind him, a leisurely two-day visit to the Foundry Exhibition at Birmingham brought home most forcibly the mechanical genius embodied in the amazing developments in foundry plant and equipment, portable units, etc., in the last few decades. Many of these innovations would have been impossible to visualize years ago, before foundrymen, engineers and scientists discovered what a vast field for improvement lay—in a manner of speaking—just on their doorstep

The superlative quality of the "live" exhibits at the Foundry Exhibition in Bingley Hall, Birmingham, removed at once the old tag about the foundry being the "Cinderella" of the engineering industry. The machinery and plant, generally, had a quality and standard of finish incredibly high for the heavy duty to be met with in use. Much of the mould-making equipment was naturally associated with the smaller and medium-size production, and limited by economics and quantities likely to be required. Not that the heavy side was neglected; far from it, there were power machines for ramming the deepest and largest pit and box moulds. Portable sand-mixers and "whizzers" were on show, which well remove from the job the endless heavy navvying previously associated with the preparation of large moulds.

A "Nightmare" Return

After a preliminary look round at the main stands—advisedly marked-off beforehand in the fabulous exhibition catalogue—the writer found an easy chair at that popular rendezvous for many overseas and other visitors, namely, the FOUNDRY TRADE JOURNAL's stand. Having previously enjoyed a session of generous "hospitality" of the type which was available *gratis* almost anywhere in the hall, he promptly passed into the "arms of Morpheus," and went on a dream visit to an imaginary foundry exhibition held about the year 1900 a.d.

What was there then to show for foundry practice—just a few stalls! Number one was a sand-mixing arrangement, then standard for most moulding shops. Here a moulder took his own floor sand, added plenty of new sand and, with a liberal use of the bucket and bosh, he threw in some "nutty slack" and ground the mixture when it reached his turn to use the ex-building-site mortar mill. Permeability and bond were unheard of, and the verdict on sand was expressed as "strong" or "rotten"—mostly rotten.

"Men of the Moment"

Further down in this nightmare exhibition of 50-odd years ago was a typical demonstration floor (inspired no doubt by the CFA stand at Bingley Hall). It was staffed by two moulders dressed in "period" wear, complete with ex-Sunday-go-to-meeting bowler-hats (on occasion used as receptacles for sprigs, chaplets and for other purposes unnamed!), and thick fustian (moleskin) trousers. Floor moulders of that period (otherwise known as "grave-diggers") invariably had "yorks" tied just below their patellas, to permit easy bending. Bell-bottoms and button-up boots were very fashionable then for hardworking men. A shoveller who was naturally left-handed was a jewel of a mate for a moulder to have. With such a pair in tandem, tons of sand were tossed up and down the floor in good time; by working in harmony, and using a return feather-stroke of the underside of the shovel, lumps were smoothed out and the burnt silt mixed in all in one continuous operation. Dust and its minions (or microns), were not considered such a menace to health in those days, as the majority of foundrymen grew their own dust filter in the form of a thick walrus moustache—at the end of the day this used to have a texture like the bowler!

Materials and Plant

Still in this dream world, the writer saw on the next stand a display of materials in common use at that time. There were sample buckets of "lousy" cowhair and strawless manure (said to be from shire geldings, and "just the job for special loam mixtures" but our forefathers loved it!). Massive pipe-nails, sprigs, hand-made chaplets, mansize riddles, and a screen for throwing the sand at—usually a building-site special (Armstrong patent)—would complete the picture. At such an exhibition, a main exhibit would be a rake-out-bottom cupola with its ex-steam-boiler shell, complete with the usual small-founders' set-up for elevating pig-iron and scrap. These materials were invariably man-handled overhead on to the first platform, and in like fashion on to the stage; wickerwork skeps containing coke were lifted first

Exhibition Aftermath

to the head-pad (Covent Garden porters had nothing on a stiff-necked cupola helper, either when mounting steps or a ladder).

One of the last stalls to come into the nostalgic dream-picture displayed sledgehammers and fancy crowbars. These were set out by the "Birmingham snake-charmers"—as the pipe- and steel-benders were then known. These tools were much in demand then for breaking the core-irons inside hot castings, where resistance to contraction on cooling off could not be permitted. (It will be appreciated that the virtues of sea-sand and linseed oil had not yet been discovered!).

Waking up to Reality

The writer had just decided in his dream that it was a very poor show indeed, when an "S.S-Queen-Mary-size" vibrator brought him back to reality, and he got the urge immediately to check up on such a vivid hallucination, and to compare his impressions of bygone days with those of modern times. So off he went on another tour of inspection, during which he maintained a stoic resistance to any more "how's-yer-father" hospitality.

He started with the sand-preparation plants, which varied from those for treating many tons per hour—embodying automatic sequence-control from knock-out to ultimate destination—to smaller self-contained units, which could mix and deliver small quantities of sand with a minimum of effort and control. Such plants produce material to any of the required permeability and bond figures now accepted as minimum standards of measure and quality, in addition to out-of-the-ordinary sand mixtures of special performance and controlled composition. There is now none of the old-time mystery of "what-is-it." Portable sand-mixers have taken away the daily "grind" of mixing sand; these mobile units can be profitably applied in several ways.

On other stands, the patterns and patternplates exhibited in various media were really works of art, and there were many outstanding examples. There is really no comparison between these and the old-time moulder-made cast-iron plates; coreboxes, etc. To the writer, the new epoxy-resin patternplates and coreboxes were a revelation in smooth mould- and core-making, and no doubt amply justify their cost and the extra processing needed. The various fillers for the resin base—marble, slate and other powdered additives—provide the necessary material strength and durability, and an almost permanent smooth surface, remarkably well suited for mould and core stripping.

Cores, Coremaking Machines, and Materials

Water-jacket coreboxes on show showed craftsmanship of the highest order. Coreblowing machines have certainly taken away the need for skilled filing and bedding-in, which was so necessary with hand-made jacket cores. Other coremaking processes, too, have been much simplified, and have developed in pace with other branches of foundry practice. The coresand binders and cores produced from them were most instructive. For example, the samples on show at one stand were representative of those used for a wide range of castings; cores were available which were immensely strong and had a skin like mahogany, and yet had a high collapse-value after pouring the moulds; intricate core-wiring and elaborate venting appeared to be quite unnecessary in many cases.

Air-hardening and rapid-baking coresand binders must hold enormous advantages for the moulding shop to-day. According to the invitations extended at the Exhibition to all and sundry, any core department in need of "pulling round" and improving can be confidently handed over to competent specialists available for consultation. There is no need to feel your way, and no "try-it-yourself" attitude.

In the field of ancillary equipment, the lightweight steel moulding boxes with styled and comfortable handles clearly provide an excellent antidote to fatigue. What an amazing improvement these are on the heavy, rough, homemade cast-iron types! The close limits of dimensional accuracy incorporated in these steel boxes confer clean lifts, low dimensional tolerances, and perfect jointlines on the castings. Moreover, there appeared to be no limit as to the style and overall sizes in which these boxes can be produced. They give—to the heavy, loose-pattern type of foundry production—new safety margins, with rigidity doubly assured.

Moulding Machines and Complete Systems

Advanced moulding machines of all types and sizes were exhibited at Bingley Hall. These have been described already in the JOURNAL, and space limitations preclude a lengthy write-up here. It should be mentioned, however, that the ancillary equipment for the machines has been developed to a fine degree, and the whole represents a sizeable step nearer to automation. Even at present, half-moulds seem to "come around the corner" at a staggering rate.

To-day's designs of mould-pouring systems, and the use of one-man-operated lever ladles, have removed one of the worst and most un-attractive features in the old-time moulding shops, where hand shanks used at the cupola spout and "catching over" in split-second sequence was a risky business. "Spare metal" was often slopped about from one shank to another and always at fast-falling temperatures. It should be realized nowadays that the saving which results from reducing scrap due to "stiff" iron alone can soon defray the cost of monorail, roller-track or other pouring systems, along with rack-and-pinion hoisting. Likewise, the employment of 10 metal-carriers, plus a few skimmers, for every five shanks can be much improved upon. Old-fashioned ungeared pouring ladles with capacities of 6 cwt. or more should be made illegal!

Cupola Construction

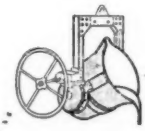
One of the most instructive ideas of the show

was the wide-open-to-view water-cooled cupola, with its immense possibilities for saving in labour, materials. etc. The model exhibit showing the water circulation at work was excellent, as was the latest water-spray device to form a spark and cinder barrier at the cupola top. The extra roof-light efficiency, and saving in gutter-cleaning, well merits attention being directed to this feature, hitherto regarded as one of the normal bugbears of blowing time. At the show, there seemed to be no limit to the labour-saving equipment that could be added to the cupola plant to make otherwise rough jobs much easier.

The majority of castings which had come to the Exhibition straight from the knock-out had such an excellent skin and general finish that shotblasting seemed rather like "gilding the lily," but the several new plants developed for this purpose were really workmanlike, and built-in robustness seemed the order of the day. (And, of course, not *all* castings produced have that superlative as-cast finish, despite what some founders would have us believe!).

Conclusion

This wonderful Exhibition showed what has been done to elevate the foundry industry to where it is on a par with other high-class branches of engineering. It is now far removed from the old "bell-bottom-trousers-and-shovel" period, and the down-to-earth foundry personnel of to-day, clothed in smart coats or clean overalls, make a tidy and methodical approach to one of the most creative branches of industry. Foundrywork can be made as attractive to school-leavers as any of the other skilled sections of industry.



What the Standholders thought:

Without exception, exhibitors at the Foundry Exhibition, held at Bingley Hall, Birmingham, agreed that it was an outstanding success, and amongst comments stressing particular aspects of the Exhibition the following were received in letters addressed either to the Foundry Trades Equipment and Supplies Association, Herbert Daniel Exhibitions, Limited, or the JOURNAL:—

"All those connected with the promotion of this first outstandingly successful Foundry Exhibition in the country are to be congratulated, and it is the general feeling that it is by no means the last to be held."

". . . your Special Issue and catalogue for the Exhibition was extremely well produced and one of the best trade catalogues I have seen. . . ."

". . . we consider the general arrangements were very good indeed, and we should certainly like to congratulate someone who had the idea of combining the Exhibition catalogue with a normal issue of the FOUNDRY TRADE JOURNAL, which, we think, was a winning idea . . . we were also very pleased with the fact that the general public and small boys were conspicuous by their absence, and we had the feeling all the time that everyone who came there had a genuine and active interest in everything they saw. . . ."

". . . it was good to see our own industry operating so successfully on its own instead of being tied to others' apron strings. . . ."

". . . In the whole of our experience, the Exhibition which you organized was by far the most satisfying in terms of contacts made and orders received. . . ."

". . . we wonder whether you are in a position to advise us whether or not the Foundry Trades' association intends to stage this Exhibition again in the next year or two . . . as we feel inclined to take larger space than this year in any subsequent exhibitions of this kind. . . ."

". . . we certainly made many extremely useful contacts, and we shall hope to have an opportunity of participating in further exhibitions of this type which may be arranged. We hope they will not be too frequent. . . ."

". . . everybody in our company who has been concerned with this stand was thoroughly satisfied. . . ."

". . . it is to your credit as organizers that such a colourful, well-arranged foundry exhibition was held . . . this is about the first complimentary letter we have ever sent to an exhibition organizer. . . ."

". . . we congratulate you on the excellent facilities and arrangements made and the smoothness in which the whole Exhibition was conducted. . . ."

". . . we were very satisfied with the results and obtained a large number of inquiries for our equipment. . . ."

". . . you will find us coming up for a second 'dose' as soon as the opportunity is available. . . ."

". . . it was managed very well indeed, particularly as it was a first effort. . . ."

". . . we were more than satisfied with the co-operation received from your good selves and the contractors . . . convey grateful thanks for the many ways, both large and small, in which you enabled us to assemble and dismantle our exhibit with the utmost expediency and efficiency."

". . . we were quite satisfied with the results of this Exhibition. . . ."

"I considered the organization excellent and your transformation of Bingley Hall a work of art. . . ."

". . . whoever was responsible for the design did wonders with the hall itself, which is a scruffy place, but during the Exhibition it looked very smart indeed. . . ."

". . . your Exhibition Issue looked like an all-out effort. . . ."

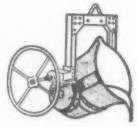
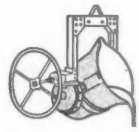
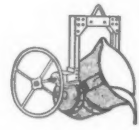
". . . preparation of this Special Issue must have

Exhibition Aftermath

represented a major task for you and your colleagues at John Adam House and I feel you are to be congratulated upon it. . . ."

". . . the Exhibition was very good and was very enlightening to me; I felt that my trip (from the United States) was well worthwhile."

". . . I was very impressed both with the organization generally and with the quality of the exhibits. . . . I believe that if the British Exhibition were given much more publicity in the USA and Canada, a number of foundrymen on this side of the Atlantic would arrange their European vacation to coincide with the Exhibition. . . ."

Verdict from Spain:

When Señor Don José Cañameras—technologist and leading industrialist of Barcelona—returned home after visiting the Exhibition, he was interviewed by a member of the staff of *Fundicion* (the Spanish foundry trade journal). Mr. Cañameras is a member of the Council of the Association of Ironfounders of Barcelona. A translation of the interview is given below:

First of all, Señor Cañameras, what were your general impressions of this Exhibition?

In my opinion this was one of the most interesting exhibitions which has been held in recent years. The visitor was given a very clear idea of the production capabilities and general worth of the foundry plant shown. It is interesting to note that more than 100 firms had stands. The number of visitors from overseas was very large.

What was the outstanding feature?

Automation, without doubt, and following this, hygiene for the shotblast plant and working areas. This Exhibition undoubtedly reflected the energy which had been devoted to the selection and control of the raw materials used in foundry practice. Control was very precise, especially in the case of sands.

Did any equipment especially impress you?

Most certainly. I saw a moulding system (not yet well known, and bearing the description "diaphragm"), which has a useful application in the moulding of irregularly-shaped patterns, which was shown in operation using a highly-profiled pattern. Briefly, the system consists of ramming the sand through the medium of an indiarubber sheet, actuated by compressed air. Amongst the automatic moulding-machines which called for admiration was one, located on Stand 10, which had a production capacity of 240 complete moulds per hour. In this machine the empty box is placed on the machine, receives the requisite amount of sand, and from thenceforth, right the way through to the casting operation, everything is done automatically. The mechanism includes a turntable with four stations and four operations to make the complete mould. The mould, at the position where it is closed, is placed on a conveyor leading to a circular station, where it is automatically weighted and placed in position for pouring.

You have referred to hygiene in connection with shotblast and working places. Is there anything new in this connection?

There were quite a number of stands devoted to this subject, showing machines capable of working without emission of fume or dust. Complete installations for the extraction of dust were displayed. Also on show were extraordinarily simple small units (designed for connection to one or more machines) that combined extraction and filtration, and which carried a minimum of ducting. Layout for catching dust has been deeply studied, and a noteworthy contribution to working conditions has resulted.

Were there any innovations regarding the shotblasting of castings?

The classical systems of using streams of sand and chilled-iron grit, etc., have been revolutionized by installations equipped with projection turbines instead of compressed air. Many improvements have been introduced into the emery-wheel grinders. The motors are now totally enclosed in the body of the machine, and variable speed gears are incorporated to compensate for the reduction in the diameter of the wheel due to normal wear. In addition, the arrangements for dust catching have been perfected and much simplified.

Was there any special melting plant?

There was indeed, especially in the case of spark and grit arresters for cupolas. I noticed especially a collector which had a water curtain that effectively prevented emission of the products of combustion by arresting the grit; this was entrained and carried to the separator, as with the shotblasting previously mentioned.

What is the main pre-occupation, apart from safety and health, of the British foundry industry at the present moment with regard to the human factor?

Apprenticeship continues to occupy the minds of the leaders of the industry. Particularly interesting was the degree of skill shown on one of the stands, where apprentices were hand-moulding quite difficult castings and then casting them (using light alloys) very efficiently and, moreover, quite rapidly.

STAINLESS STEEL, jewellery, modern silver—including some of the best pieces made in recent years—and enamel work are on show, at Stoneleigh Abbey, Warwick, until September 21.

THE NEWCASTLE OFFICE of the Lancashire Dynamo Group has been moved to new premises at Eagle Star House, 32-34, Mosley Street, Newcastle-upon-Tyne, 1.

Atlas Copco's New Factory

Atlas Copco, a firm of Swedish origin, has now been manufacturing in this country for 40 years, and has achieved notable success in the making of diesel engines, pavement breakers and rock-drilling machines. Their works at Wembley being no longer sufficiently large to cater for increased business, it was decided to build new premises at Marylands Avenue, Hemel Hempstead. These have cost about £25,000, and include both office accommodation and manufacturing facilities of a high order. The office buildings are particularly pleasing—the floral decorations displayed at the opening ceremony were most artistic, and reminiscent of Swedish indoor-decoration at its best.

Section of the hardening and heat-treatment shop in the new Atlas Copco factory at Hemel Hempstead.

Opening Ceremony and Luncheon

The opening ceremony was performed by Lord Mills, K.B.E., Minister of Power, with the Bishop of Bedford giving the project a blessing. At the luncheon which followed, over which the Viscount Bridgeman, K.B.E., C.B.E., D.S.O., M.C., the chairman of Atlas Copco (Great Britain), Limited, presided, speeches were made by Lord Mills, the Swedish Ambassador, H.E. Gunnar Haggloff, G.C.V.O., Mr. J. C. Greig and Mr. K. A. Belfrage, the managing director of the Swedish parent company. Distinguished representatives of many dominion countries were at the high tables.

Site Specification

The new site covers 6¾ acres, the area of the new factory building being 54,700 sq. ft. Ample room has been left for future extensions, and already an additional 130,000 sq. ft. of manufacturing facilities is envisaged. The works use very large quantities of grey-iron castings, and there is every prospect that their requirements will continue to grow.

(It is interesting to recall that this country's forerunner of Atlas Copco—Atlas Diesel Company, Limited—was registered 40 years ago, with a capital of £2,000, facts recorded in the FOUNDRY TRADE JOURNAL of that date.)

DSIR Lending Library

The Lending Library Unit of the Department of Scientific and Industrial Research, operating from 20, Chester Terrace, Regent's Park, London, N.W.1, includes the following amongst summaries of reports which have recently become available for inspection or borrowing. In certain circumstances, enlarged photo-copies or microfilm copies are obtainable, and all enquiries should mention the reference numbers quoted.

TIDU 6189: Casting of Metals in Plaster Moulds (T.I.S. No. 4). Speciality moulding processes are reviewed briefly. The report then discusses the use of plaster moulds for aluminium-, copper- and zinc-base alloy castings. Brief data are given on comparative costs, relative to sand moulds, and on applications. Metallurgical features of plaster mould casting are described and a bibliography is included. Extracts are also given from a report on the plaster mould casting of high-speed impellers by H. Brecht, Bendix Aviation Corporation—1952. (Microfilm 3s. 6d.; enlarged print 17s. 6d.)

TIDU 6190: Casting of Metals in Permanent Moulds (T.I.S. No. 3). The various forms of permanent-mould casting are defined and their general characteristics are reviewed. Brief information is given on the techniques of permanent-mould casting and an annotated bibliography is included. Specifications are given for mould washes. (Microfilm 4s. 6d.; enlarged print 22s. 6d.

TIDU 6191: Planning the Grey-iron Foundry (T.I.S. No. 2). Foundry layout, melting plant, moulding equipment, fettling and storage are reviewed briefly. A more detailed discussion is given on the characteristics of moulding sands. A useful bibliography is included and reference is made to a report prepared by the Anglo-American Council on Productivity entitled "Grey-iron Founding." (Microfilm 3s. 6d.; enlarged print 17s. 6d.)

TIDU 6173: Impregnation of Metal Castings (T.I.S. No. 24). The conditions for which impregnation is justified are specified briefly and a short discussion is given of the various materials and methods used. A bibliography lists some 35 references to the subject. (Microfilm 2s. 6d.; enlarged print 12s. 6d.)

Stornoway House

Stornoway House, an historic mansion overlooking Green Park, London, has now become the headquarters of the Firth Cleveland Group. It was opened recently, after rebuilding, by its last resident, Lord Beaverbrook, who lived there from 1921 until its destruction by German bombs in 1941. The rebuilding has been carefully carried out, under the personal supervision of Mr. C. W. Hayward, chairman and managing director of the group, so that it has much the same aspect as when it was built by Lord Grenville in 1794. The basement kitchens have been converted to a showroom, and a selection of the 100 diverse products of the group are attractively displayed. Readers are invited to visit these showrooms where they can inspect the very interesting Surform tools, garden implements, radio sets, etc., and a variety of industrial equipment.

F. TAYLOR & SONS (MANCHESTER), LIMITED—Col. L. Bullen has been appointed managing director.

Birthday Honours

Recognition of services to the foundry, iron and steel, and allied industries was made in the Birthday Honours List. Details of some of the principal awards and biographical notes on the recipients are given below:—

KNIGHTS BACHELOR

Mr. L. C. GAMAGE, chairman and managing director of the General Electric Company, Limited, and president of the Institute of Exports; Mr. A. M. C. JENOUR, chairman and joint managing director of the Aberthaw & Bristol Channel Portland Cement Company, Limited, and a member of the Development Corporation for Wales; Capt. W. M. H. POLLEN, chairman of Burt Bros., Limited, and of Sheffield Steel Products, Limited, and subsidiary companies; Mr. K. H. PRESTON, chairman of Stone-Platt Industries, Limited, J. Stone & Company (Holdings), Limited, Platt Bros. (Sales), Limited, and Textile Machinery Makers Limited, and a director of W. & T. Avery, Limited, and Henry Pooley & Son, Limited; Mr. W. W. WOOD, former Town Collector of Sheffield and the only man to have been Master Cutler six times. After practical experience in a Sunderland marine engineering works he joined the Wardsend Steel Company, Limited, which had been founded by his grandfather in 1860. He owned and controlled the firm when it was acquired by Darwins, Limited, in 1944.

ORDER OF THE BATH

CB

Col. T. F. HOOD, a director of Spencer (Melksham), Limited, manufacturers of elevating and conveying plant, etc., and other companies.

ORDER OF THE BRITISH EMPIRE

GBE

Sir WILLIAM PALMER, chairman of the Catmur Machine Tool Corporation, Limited, vice-chairman of Rank Precision Industries, Limited, and from 1944 to 1946 principal industrial adviser to the Board of Trade. He is chairman of the European Free Trade Committee.

CBE

Mr. T. C. HEWLETT, a director of the Anchor Chemical Company, Limited, and the United Oil & Natural Gas Products Corporation, Limited; Mr. C. F. L. KING, a director and general manager of the British Wagon Company, Limited, and a director of other companies; Mr. A. H. WHITE, deputy chairman and managing director of Lithgows, Limited, the Port Glasgow shipbuilders and repairers.

OBE

Mr. K. S. ARNOLD, a director and general manager of Duncan Stewart & Company, Limited, hydraulic and steelworks engineers, etc., of Glasgow; Mr. H. BOWLEY, senior principal scientific officer, National Physical Laboratory; Mr. A. BREWIN, senior principal scientific officer, Explosives Research and Development Establishment, Ministry of Supply; Mr. D. R. GRAESSER, director of Higginbottom & Company (Manchester), Limited, chemical and metal merchants; Mr. D. A. PALMER, chairman and managing director of Joseph Rodgers & Sons, Limited, Maleham & Yeomans, Limited, and Read & Oxley, Limited, and chairman of Reavell & Company, Limited; Mr. N. J. PAYNE, partner in Frederick Snow & Partners, consulting engineers, of London, W.C.2; Mr. G. A. PLUMMER, a director of John Thompson, Limited, La Mont International Association, Limited and La Mont Steam Generator Limited; Mr. S. H. RUSSELL, chairman of S. Russell & Sons, Limited, Leicester, ironfounders and engineers, and a past-president of the Institute of British Foundrymen, the National Ironfounders Employers' Federation, and the British Cast Iron Research Association; Mr. N. C. SMART, chief engineer (telephone and exchange system), General Electric Company, Limited.

MBE

Mr. M. ADAMSON, blast-furnace projects engineer, Ashmore, Benson, Pease & Company, Stockton-on-Tees; Mr. C. ALLSOP, chief research engineer, Bruce Peebles & Company, Limited, manufacturing electrical engineers of Edinburgh; Mr. P. ARMSTRONG, superintendent of the erecting shop, W. H. Allen, Sons & Company, Limited, hydraulic and electrical engineers, etc., of Bedford; Mr. W. C. E. BELL, manager and engineer of the ore preparation and sinter plants of Dorman Long (Steel), Limited, Middlesbrough; Mr. E. BERRY, deputy manager, contracts department, Vickers-Armstrongs, Limited; Mr. W. H. BICKLE, senior experimental officer, Department of Scientific and Industrial Research; Mr. R. A. HARMAN, chief civil defence training officer, Imperial Chemical Industries, Limited; Mr. T. A. HOUGH for 14 years works manager of the D.P. Battery Company, Limited, Bakewell (Derbyshire); Mr. G. D. MCGLASHAN, senior assistant works manager, Alexander Stephen & Sons, Limited, shipbuilders and repairers, etc., of Glasgow; Mr. B. PRINGLE, manager of motor engineers, British Thomson-Houston Company, Limited, Rugby; Mr. A. RODGER, electrical manager, William Denny & Bros., Limited, shipbuilders, of Dumbarton; Mr. S. SHAW, welfare and safety officer, George Kent, Limited, industrial instrument and automatic control manufacturers, of Luton; Mr. J. A. W. SINCLAIR, chief designer, Brown Bros. & Company, Limited, metal stockholders, etc., of Edinburgh; Mr. F. H. SMITH, director of optical design, C. Baker Instruments, Limited, Croydon; Mr. J. M. STAMPER, honorary secretary of the Hull Productivity Committee and secretary of the Hull Iron Trades Employers' Association; Miss M. H. TURPIE, senior executive officer, Ministry of Power; Mr. D. C. WOOLLARD, higher executive officer, Ministry of Power.

BRITISH EMPIRE MEDAL

Mr. E. R. BOOTH, toolroom foreman, Moore & Wright (Sheffield), Limited; Mr. G. BOWMAN, head foreman, Harland & Wolff, Limited, Belfast; Mr. E. CHAMBERS, chargehand plater, the Tees Side Bridge & Engineering Works, Limited; Mr. J. COOK, charging machine driver, Colvilles, Limited; Mr. W. CRAIG, traffic and materials supervisor, J. & E. Hall, Limited, Glasgow; Mr. G. H. HERON, foreman fitter, Middle Docks & Engineering Company, Limited, South Shields; Mr. W. JONES, steelworker, John Summers & Sons, Limited, Shotton (Ches); Mr. C. H. MACKENZIE, process foreman, fabrication of titanium, Imperial Chemical Industries, Limited (Swansea); Mr. J. NEELD, toolmaker, C.A.V., Limited, Acton; Mr. G. A. NEWBY, head foreman shipwright, J. S. Doig (Grimsby), Limited.

THE EASTERN REGION of the Institution of Production Engineers is organizing a conference on the theme "Production Engineering as a Function of Management." It is to be held in Norwich on September 24 and 25. Details are available from the conference secretary, c/o George Wortley, Limited (Travel Agents), 4, Charing Cross, Norwich, Norfolk.

News in Brief

THE SWISS IRON FOUNDERS' ASSOCIATION reports that the 1958 production of iron castings in Switzerland was 150,000 *tonnes*, as against 185,000 *tonnes* in 1957.

SANDERS & FORSTER, LIMITED, structural engineers, report that their standard building department is being transferred from head office at Barking to new and larger premises adjoining the branch works at Warton Road, London, E.15.

THE FOUNDRY EQUIPMENT FIRM, Coleman-Wallwork Company, Limited, Stotfold, near Arlesley, Beds., are taking space at the forthcoming International Trade Fair to be held in Brno, Czechoslovakia, from September 6 to 20.

THE NEW PLANT in East Kilbride of J. R. Carruthers & Company, Limited, pump makers, was started up in the week commencing August 3. According to a spokesman of the firm the new factory will be officially opened on September 18.

THE BRISTOL COLLEGE OF TECHNOLOGY, as from September 1960, will be designated as a college of advanced technology. It will be the ninth to be thus designated under the Government's plan for expanding technical education.

RUSTON & HORNSBY, LIMITED, engineers, Lincoln, have granted staff with more than five years' continuous service after the age of 20, an extra week's holiday with pay, giving them three weeks' holiday. The scheme comes into operation immediately.

THE UNITED STATES AMBASSADOR, Mr. John Hay Whitney, and Lord Shawcross, P.C., Q.C., will be the principal speakers at the 1959 National Conference of the British Institute of Management. This year it will be held at Harrogate from November 17 to 19.

THE ATOMIC ENERGY AUTHORITY will be staging an exhibition in Sheffield in November or December this year. There are to be two main sections of the exhibition: one will deal with atomic energy as a means of generating electricity and the other will cover radio-isotopes.

DURING EXCAVATION WORK inside the iron foundry of R. & A. Main, Limited, Falkirk, some Roman fortifications, believed to have been an outpost, have been unearthed. The site of the foundry is known to have been one of the important stations on the Antonine Wall.

TRANSMISSION ACCESSORIES, LIMITED, has changed its name to the Conveyor and Shotblast Company, Limited, Leighton Buzzard, as its activities now include the manufacture of cut-wire steel shot. The making of FE-Line segmental wire-rope overhead-conveyors is to be continued.

REMAINING COPIES of the publication of the South African branch of the Institute of British Foundrymen, "Casting Design as Influenced by Foundry Practice," by Oliver Smalley, O.B.E. (with a foreword by D. Lion-Catchet) are being offered for sale to local members at 10s. 6d. each.

Mr. DAVID ROBERTSON, managing director of Ferrous Castings, Limited, Warrington, has saved the firm from closing by purchasing it from the proprietors, Metal Industries, Limited, who announced in April that they would be closing the factory on July 24. The name has been changed to Ferrous Light Castings (1959), Limited.

STEWARTS AND LLOYDS, LIMITED, are receiving an order to supply about 270 miles of 16-in. dia. steel pipe for use in the construction of an oil pipeline in Assam. The order, which is being placed by the Burmah Oil Company on behalf of Oil India Private and with the agreement of the Government of India, is worth £2,000,000.

FOLLOWING THE COMPLETION of their new Efco automatic hardening and tempering line, Caterpillar Tractor Company, Limited, have placed further orders for furnaces with Electric Resistance Furnace Company, Limited. The new orders valued at nearly £50,000 cover the supply of both batch- and continuous-hardening furnaces and a continuous-tempering furnace.

THE ENGINEERING FIRM of Blake, Barclay & Company, Limited, Greenock, has been acquired by Mr. Archibald D. Kelly, Kilmacolm, who has various engineering interests in the district. A reorganization scheme which is now in progress is likely to be completed within the next two months. New types of sugar machinery are to be built at the works. It is hoped eventually to increase the number of employees from 40 to 150 or more.

J. D. S. TOWNSHEND & COMPANY, LIMITED, 99, Fenchurch Street, E.C.3, has been formed to take over the agency business hitherto conducted by Mr. J. D. S. Townshend, formerly of the Sandwell Casting Company. The company is represented in London, the Home Counties and Southern England, and is agent for iron, steel, malleable and non-ferrous founders, and gravity and pressure-die-casters in aluminium and Mazak.

"OPERATIONAL RESEARCH AT WORK" will be the subject of a one-day conference organized jointly by the British Institute of Management and the Operational Research Society. It will be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on Thursday, September 17. The objective of the conference is to assist management in assessing the extent to which the techniques of operational research are applicable within industry.

THE FIRST INTERNATIONAL CONGRESS ON METALLIC CORROSION will be held in South Kensington, London, during the week April 10 to 15, 1961, under the presidency of Sir Harry Melville, K.C.B., D.SC., F.R.I.C., F.R.S. Mr. E. Leslie Streatfield has been appointed chairman of the executive committee and Dr. J. Ferguson, chairman of the finance committee. The honorary secretary is Lt.-Col. Francis J. Griffin. Further information may be obtained from the honorary secretary at 14, Belgrave Square, London, S.W.1.

TWO BRITISH COMPANIES, Leyland Motors, Limited, and Metropolitan-Cammell-Weymann, Limited, after facing fierce international competition from Germany, USA, and Japan, have secured a £1,500,000 contract from Cuba for 200 diesel buses. They will operate in the City of Havana, where 620 Leyland buses valued at 8,680,000 dollars were shipped eight years ago. The economical and reliable service given by these buses in the Cuban capital have influenced considerably the placing of the new order.

A NUMBER of Aberdeen's old steam trawlers are to be broken up at the Montrose shipbuilding yard, recently taken over by John Lewis & Sons, Limited, Aberdeen. The first trawler to be broken up will be the Loch Awe and other trawlers will follow at intervals. A spokesman for the firm said that the Montrose yard will not be used only for shipbreaking. The firm will build new vessels there as well, and one now actually under construction is a trawler 1,046-ft. long for Aberdeen owners.

News in Brief

ESTABLECIMIENTOS INDUSTRIALES LARA, the first Venezuelan plant for the manufacture of household appliances, was recently established in the city of Barquisimeto (Lara). Totally owned by domestic interests, the company has a capitalization of 8 million bolivares (£800,000), and will engage in the manufacture and marketing of refrigerators, washing machines, kitchen ranges, home incinerators, and other items. When operating at full capacity, the plant will employ about 3,000 people.

A TEAM OF SOVIET EXPERTS has arrived in Colombo under the technical and economic assistance programme, to begin work on a £7,500,000 iron and steel project. The entire capital for the project is to come from the 120,000,000 roubles loan granted to Ceylon by the Soviet Union under an agreement signed in January last year. The factory is to be established in three easy stages. In its third stage, local iron ore will be smelted to produce the required quantities of pig-iron for the steel works and the local foundry industry.

THE RAPID DEVELOPMENT in recent months of South Africa's new iron-ore exporting industry, facilitated by the easing of the Union's rail transport bottleneck as well as by the recent higher rate of activity in the world's steel industry, has resulted in a firm—Fritzmorr Exploration—setting themselves a target of 500,000 tons for 1961. At present they ship some 15,000 tons a month. The Union's total exports of iron ore in June alone were more than double those in the whole of 1958, while exports for the first six months of 1959 were more than six times 1958's total tonnage.

THE FIRST double-deck long-distance motor coach with its engine at the rear was introduced by Ribble Motor Services, Limited, Lancashire, in Bank Holiday week. The vehicle is an Atlantean rear-engined model produced by Leyland Motors, Limited, with a 50-seater coach body built to the design and layout of Ribble's engineering department by Metropolitan-Cammell-Weymann, Limited. The coach is 30-ft. long, 8-ft. wide, 14-ft. 4-in. high and weighs nearly 10 tons. So far Ribble Motor Services have ordered 51 Atlantean chassis from Leyland's, although not all of these vehicles will be used for luxury coaches.

UNIVERSAL-MATTHEY PRODUCTS, LIMITED—an associate company of Johnson, Matthey & Company, Limited, and Universal Oil Products Company—has formed a subsidiary company in Cologne, Universal-Matthey Products (Deutschland), GmbH, with a nominal capital of DM 20,000 (£1,700). The objective of the company is the manufacture of platinum catalysts to meet the needs of petroleum refineries employing the UOP Platforming process in Western Germany and the Common Market countries. Mr. L. C. Montague and Mr. F. O. Newton have been appointed members of the board of administration, and Mr. A. E. Richards has been appointed manager.

A NEW open convector fire, available in a range of attractive vitreous-enamel colour finishes, is being introduced by Newton Chambers & Company, Limited of Thorncliffe, near Sheffield, for the coming autumn. Called the Redfyre Convector 2, the fire will burn any domestic smokeless fuel or house coal and is designed for rooms up to 2,000 cub. ft., heating by both radiation and convection. Designed in consultation with Brian Asquith, A.R.C.A., the fire has neat simplicity of line — and the front has a vitreous-enamel finish in blue-grey, off-white, plain cream or black lustre. A clip-in safety guard (which cannot get hot), of heat-resistant chromium finish is an integral part of the appliance.

COMMONWEALTH ALUMINIUM CORPORATION, LIMITED (COMALCO) has spent £A1,000,000 so far on surveying vast bauxite resources discovered at Weipa on Cape York Peninsula in North-Eastern Australia, according to Mr. Evans, Queensland Minister for Mines. He said that much of the Corporation's spending had been on further prospecting to assess the extent of the field, on drilling for water and on the construction of a small township. The Corporation was now surveying in detail Port Musgrave, on the north-east coast of the peninsula, in an attempt to maintain a navigable channel and establish a suitable harbour. British Aluminium, Limited, and the Australian company, Consolidated Zinc, are associated in the enterprise.

Dr. F. J. DU TOIT, chairman of Foscor and Sasol and deputy chairman of Iscor—three big semi-state industries of the Union of South Africa—reports that during the last financial year, Sasol returned a cash surplus from its oil-from-coal operations; Iscor will be producing nearly 2,500,000 tons of steel by 1961; and Foscor has all the raw materials required to make the Union independent of phosphate fertilizer imports. The large quantities of chemical raw materials being produced by Sasol and Iscor would form the basis of a vast new chemical industry in the Union. A £56,000,000 expansion programme was in progress at Iscor and the value of its products this year totalled about £60,000,000.

THE ASSOCIATION OF BRONZE AND BRASS FOUNDERS is organizing area competitions for bronze and brass foundry apprentices, the purpose being to encourage these apprentices; to provide candidates for the European Foundry Apprentice Competition to be held in this country next year; and to attract young people to the foundries. The competitions will comprise both practical and written work. The secretaries of the Association, Heathcote and Coleman, 69, Harborne Road, Edgbaston, Birmingham, 15, invite bronze and brass founders in the Midland, Yorkshire, Lancashire and Cheshire areas, and Scotland, to let them know if they would support such competitions and also the number of apprentices under 21 years of age they would be prepared to enter.

THE COMBUSTION ENGINEERING ASSOCIATION CONFERENCE is to be held on November 3 and 4 at the Royal Hotel, Scarborough. The "Automatic Boiler House" covering the application of automation to the smaller industrial boiler plant using solid fuel is one of the main topics to be discussed. Four technical sessions to discuss "Fuel and Ash Handling," "Combustion and Mechanical Firing," "Principles of Automatic Combustion Control," "Application of Automatic Control" will be followed by group and open discussions, and a final session at which the economics of automatic equipment will be assessed. The conference will be open to the public. Full details are available from the Association, at 70, Jermyn Street, London, S.W.1.

Foseco Competition

Foundry Services, Limited, Long Acre, Nechells, Birmingham 7, announce that from the very large number of entries in their "1978" Competition, the judges have selected the article by Mr. D. Lie Eide of Bergen, Norway, for the most original thought in all aspects of foundrywork. Mr. Eide has received the first prize of £100, the second prize was divided between Mr. L. Bearne, Lower Stondon, Beds., and Mr. R. F. Cornell, Braintree. The third prize went to Mr. F. D. Roper of Dudley, Worcs.

Personal

Mr. R. H. POWELL has relinquished his appointments with the Griffin & George group of companies.

Mr. T. FURNESS, secretary and a director of Thomas Robinson & Sons, Limited, Rochdale, has been appointed a joint managing director of the company.

Mr. FREDERICK E. MYER has been appointed the director of the Singer Sewing Machine Company, Limited. He will continue to be manager of the accounts department.

Mr. R. H. C. BOYS has been appointed a director of Roan Antelope Copper Mines and of Mufulira Copper Mines. Sir CHARLES CUMMINGS has resigned from the boards of both companies.

Mr. W. J. BIRD has been appointed to the board of Claude-General Neon Lights, Limited, a subsidiary of the General Electric Company, Limited. Mr. Bird is home sales director of the parent company.

Metropolitan-Vickers Electrical Company, Limited, have appointed Mr. E. J. SCOTCHER, B.SC. TECH., A.M.I.E.E., as factory superintendent at their Huyton works. He was previously assistant superintendent.

Mr. K. E. WALKER, director in charge of the engineering division of Newton Chambers & Company, Limited, Thorncliffe, Sheffield, has been elected a director of the F. C. Construction Company, Limited, ironfounders, Derby.

Mr. R. C. HEYS, deputy chairman and managing director of Millspaugh, Limited, Sheffield, was amongst 17 employees of the company to receive, on August 14, presentations on completion of 25 years' service with the firm.

Mr. JAMES ALDERSON, formerly secretary and a director of Hartley & Sugden, Limited, boilermakers, Halifax, celebrated his golden wedding on August 10. Mr. Alderson retired in 1955, after 59 years' service with the company.

Mr. A. L. STOCK, managing director of the Morgan Crucible Company, Limited, has been appointed chairman in succession to Mr. PETER LINDSAY, who has retired because of advancing age. Mr. H. L. MATTHEY becomes managing director.

LORD BAILLIEU, K.B.E., C.M.G., president of the Dunlop Rubber Company, Limited, has accepted the nomination of the Council of the British Institute of Management for election as president at the annual general meeting in October.

Mr. T. CROMPTON, financial director of Yorkshire Imperial Metals, Limited—owned jointly by Yorkshire Copper Works, Limited, and Imperial Chemical Industries, Limited—has been appointed a director of Yorkshire Copper Works (Holdings), Limited.

Lord Mills, Minister of Power, has appointed Mr. C. R. KING to be chairman of the Electricity Council in succession to Sir HENRY SELF, who retires on August 31. Professor R. S. EDWARDS, who is at present a part-time deputy-chairman of the Electricity Council, will serve full time from October 1.

LORD REITH has been appointed a director of the North British Locomotive Company, Limited, Glasgow. He is vice-chairman of the British Oxygen Company, Limited, and a director of Tube Investments, Limited. In March last he retired from the chairmanship of the Colonial Development Corporation.

Mr. L. R. P. PUGH, director and secretary of Guest Keen Iron & Steel Company, Limited, has been appointed assistant managing director and is succeeded as secretary by Mr. C. F. PAGNAMENTA, at present chief accountant. Mr. B. W. JOHN, at present assistant secretary succeeds Mr. Pagnamenta as chief accountant.

Mr. G. R. J. HALLAM has been elected a director of H. W. Kearns & Company, Limited, Broadheath, Altrincham. He has been appointed works director in succession to Mr. OSCAR RENDELL. Mr. Rendell has retired from the directorship because of ill health but will remain with the company in a consultative capacity.

Air Commodore FRANCIS RODWELL BANKS is joining the board of the Blackburn group. He will also join the boards of two other companies in the group—Blackburn Aircraft and Blackburn Engines. Until recently Air Commodore Banks was a director of Bristol Aeroplane Company, Limited, and Bristol Aero-Engines, Limited.

Mr. M. ROBINSON—who has been associated with the Lancashire Dynamo group since 1946—has been appointed manager of the group's Bristol area office in succession to Mr. E. N. EVANS. At a lunch held recently in Bristol, Mr. D. C. Lorkin (managing director of the group) made a presentation to Mr. Evans on behalf of the company, directors and staff.

VISCOUNT FALMOUTH has been re-elected president of the British Internal Combustion Engine Research Association and the following have been re-elected vice-presidents: Sir HAROLD ROXBEE COX; Rear-Admiral W. F. B. LANE (director of Marine Engineering, Admiralty); Mr. H. N. PEMBERTON (chief engineer surveyor, Lloyd's Register of Shipping); Professor O. A. SAUNDERS; and Brigadier S. A. STEWART (director, Royal Engineer Equipment, Ministry of Supply). Mr. J. G. DAWSON and Mr. A. G. HOWE have been elected to the Council in succession to Mr. G. B. R. FEILDEN and Mr. LAWRENCE ROBSON. Mr. V. H. F. HOPKINS has been elected as chairman of Council and Mr. J. G. DAWSON as vice-chairman.

Obituary

Mr. W. E. WATSON, M.B.E., who was works director of the Smiths Aviation Division, Cheltenham factory, has died at the age of 56.

Mr. J. A. MARSHALL, senior, founder and president of Marshall & Anderson, Limited, Broomside Boiler Works, Motherwell, has died at the age of 83.

The death has occurred at the age of 62, of Mr. THOMAS GEOFFREY LUCAS, director of Edward Lucas & Sons, Limited, ironfounders, Dronfield, near Sheffield.

Mr. C. E. JARVIS, who has died at the age of 88, was until his retirement leader of the drawing office staff of Newton Chambers & Company, Limited, Chapeltown, Sheffield.

Mr. J. B. HEMSLEY, a former metallurgist at Samuel Fox & Company, Limited, Stocksbridge, Sheffield, has died at the age of 67. He served with the company for 50 years before retiring in 1957.

Dr. WILLIAM KERR, C.B.E., Emeritus Professor of Civil and Mechanical Engineering and Applied Mechanics at the Royal College of Science & Technology, Glasgow, has died at the age of 72. He had been a distinguished student of the College before joining the staff in 1919, following extensive practical training with the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow, where he was engaged with the design of large sets of turbine machinery and gearing. He gained the Ph.D.deg. of Glasgow University in 1923. His work on the steam friction of turbine wheels and on the critical speeds of revolving shafts was incorporated in many text-books.

Raw Material Markets

Iron and Steel

Many of the foundries have now returned to work following their annual holidays. Most establishments are quite busy. While there is still a varying degree of business available, depending on the type of castings produced, this is not so pronounced as before. Most of the light foundries continue to be much better employed with the improved demand for castings for household appliances and for the building trade. Their capacity is, however, nowhere near fully absorbed. The jobbing foundries could undertake more work and the textile foundries are similarly placed. The high-phosphorus iron used by these foundries is plentiful.

The motor vehicle industry continues to provide the engineering foundries with sufficient business for high-duty castings to enable them to return good outputs. Other sections of the engineering and speciality foundries supplying castings to other trades are also fairly well engaged, and there has been some improvement in the call from the machine-tool industry. The pig-irons used by these foundries, chiefly in the low-phosphorus grade, are readily available. The requirements of the engineering foundries for hematite pig-iron are readily met, while the refined iron makers are also short of orders. The steelworks are able to obtain easily all the basic pig-iron required for consumption and stock. Producing furnaces have fairly heavy stocks of all grades of pig-iron, and have tonnages available for export. Some business is being obtained for shipment, but competition continues very stiff.

Much improved trading conditions are found at the re-rollers, whose business has been increasing in recent weeks. There is a continued upward demand for small bars and light sections, and the rollers of reinforcing rods and wire rods are very busy. The extent of the increased trade is reflected in the bigger call for steel semis and many of the steelworks are committed for their outputs for three or four weeks ahead; this period of delivery most of them require for fresh business.

Non-ferrous Metals

It would be difficult, if not impossible, to telescope satisfactorily in a few paragraphs all the major influences affecting the non-ferrous metal markets since our last report before the printing industry dispute. In general terms, however, the copper market on both sides of the Atlantic has been decidedly shaky at times, with the markets in both centres waiting for a decision one way or the other on what was to be the best advertised strike in history and which finally started last week when there was a walk-out at four western US plants of the Kennecott Copper Corporation.

Before the strike last week buying was, at best, only fair and the market was tested from time to time by either raising or lowering the custom smelters' and producers' price. The fact that the markets were flat was due to production outrunning consumption, with the consequence that stocks are at record levels in the US and have gained about 6,000 tons in the UK over the past six months.

Corrective action has been lacking, apart from a few companies stating that they were cutting back production by about 10 per cent. Yet the economies of both the UK and the US are getting into top gear and, with both Wall Street and Throgmorton Street doing brisk business, the quotation regained a great deal of its former losses, particularly in this country.

The present position is that demand in the UK can be described as quietly steady, that of Europe quiet, while in America supplies are building up to peak levels.

The strike at Kennecott looks like spreading throughout the US copper industry and it is expected that by the end of this week Anaconda and Phelps-Dodge will also be strike-bound, thereby idling some 40,000 workers. There is, however, a possibility that agreement may be reached shortly. Even so, stocks are high and fabricators can live off their fat for some time before anything like an emergency appears. The curious thing is that no one seems clear on what are the demands made by the labour unions. Usually reliable sources say that the principle issue centres around a wage increase of 15 cents an hour, but this has not been officially stated. The US custom smelters' price and the producers' price are both the same at 30 cents a pound, at which level demand is quiet. At the end of July, stocks of refined copper in the US totalled 103,432 tons. This figure compares with a total of 85,674 tons at the end of June.

In the UK demand is quiet, but reasonably satisfactory bearing in mind that this is still the holiday period. The market has derived strength from the labour situation in the United States, but in view of the stock position over there and in this country the US strike will have to be widespread and will have to endure for a while before the price levels rise very far. At the end of last week stocks of refined copper in LME warehouses totalled 15,038 tons.

Tin has been a consistently good market over the past two months. The buffer stock manager is thought to have reduced his stocks, which, if true, says a good deal, as the quotation has edged up and is now well clear of £790 a ton. In the US demand has been quiet owing to the month-old steel strike, which has tied the hands of the tinplate industry. This situation has been reflected in the New York quotation, which is fractionally below $1.03•a pound. At the end of last week stocks in LME warehouses totalled 8,553 tons.

Lead, after its long period in the doldrums, appears to be coming to life—albeit slowly. In any event, the UK price is now well above the £70 a ton level which had acted as a magnet for the quotation for so long. The outlook is better, too, as the undertone is firm and the belief is that the price will go higher in the months ahead. In the US the price has held steady at 12 cents a pound.

Zinc has fared better than any of the other metals over the past two months and the quotation has slowly, but persistently, gone towards higher levels. In the UK demand is good for both high-grade and ordinary brands and the outlook is reasonably bright, demand is concentrated mainly on nearby supplies, which are not too plentiful. In the US the steel strike has slowed down demand somewhat, but sentiment over there is good and so soon as the steel strike is over a rise in the price from its present level of 11 cents a pound can be looked for.

BRITISH TRANSPORT COMMISSION announce that about 350 traders are now regularly making use of the packing-case hire service introduced by British Railways in co-operation with Collico, Limited, of Barking. The latest figures show 11,250 cases to be on hire. This service, provides collapsible cases on a monthly hire basis, and the hiring charge covers the cost of rail carriage both on the loaded and empty journeys; senders pay rail charges on only the weight of the contents. Each container can carry up to 2 cwt. of merchandise and is suitable for any type of small consignment.

Madam, you're plugging into the atom *(and steel is helping as usual)*

A REPORT BY J. STUBBS WALKER

MRS. ADA McALLISTER IS ONE OF BRITAIN'S ATOMIC HOUSEWIVES.

Part of the power she uses every day in her all-electric house near Whitehaven comes from the world's first industrial atom power station at Calder Hall, not many miles away.

And Mrs. McAllister, unlike some of her neighbours, is well aware that she is one of the first people in the world to be "plugged in" to the atom. Two of her daughters, her husband and a son work at the atom plant.

But until I talked to her about it, Mrs. McAllister did *not* know that without the help of the Steel Industry, the fantastic energy of the peaceful atom could never have been controlled and contained.

JOHN STUBBS WALKER *is internationally known as a writer and broadcaster on scientific and technical subjects. He is a specialist on electronics and atomic energy, and recently completed a survey of the research done by the British Steel Industry.*

MRS. ADA McALLISTER *uses the atom for power, but she didn't realise how necessary steel is to make that power available. The vital part that steel plays in peaceful atomic energy may surprise you, as it did her.*

EVERY INCH PERFECT

Great steel plates form the huge cauldrons in which the energy of the atom is released. At the biggest of all the atom plants now being built, at Hinkley Point in Somerset, the two atomic furnaces are in gigantic spheres of steel, three inches thick, weighing 1,700 tons each. Every inch of them has to be perfect – free from the slightest flaw.

Around them stand twelve 90-ft. high towers, each one made of 900 tons of steel. Inside are some 20 miles of steel tubing studded with millions of steel fins. These are the "heat exchangers" in which heat from the atom is used to raise steam.

Then there are steel supply pipes – mile upon mile of them plus 12,000 tons of reinforcing steel in the concrete that protects and supports the plant.

But there is more than sheer quantity in the help steel has given to atomic power. Steel *controls* that enormous power. Rods of special steel can be plunged in to the very heart of the reactor, absorbing some of the energetic particles and reducing the heat given out. Ordinary steel would not do for this.

EVEN BETTER THAN THEY EXPECTED!

The atom scientists called on the Steel Industry for a steel with a high *boron* content, which would soak up atomic energy.

By the high standards attained in alloy steel productions, boron steel is not difficult to make, even with the high boron content which the atom scientists required. But it is very difficult to make a boron steel that can be shaped easily.

From Sheffield, centre of the special steels industry, came the answer – a steel containing boron that could be shaped with ease. The steel men gave the atom scientists even more boron in this steel than they had asked for originally.

Then there are thin tubes of stainless steel – inelegantly named "sniffers" – on which the safety of an atom plant depends. They "sniff" at each fuel channel to check for radioactivity, which would indicate a burst fuel element. At Calder Hall, every fuel channel – and there are thousands of them – is "sniffed" every 27 minutes.

There is no doubt about it Mrs. McAllister would not yet be plugged in to the atom but for the work the steel men have done for nuclear power.

This personal report was invited by the British Iron & Steel Federation, which believes that everyone in Britain should know the facts about steel and about the men who make it.

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

August 19, 1959

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 6-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 6-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron), Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 11s. 6d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire, in 6-ton lots or over.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 0s. 0d. to £43 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £56 10s. 0d. to £60 10s. 0d., scale 15s. 0d. to 16s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 7d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 7d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £77 0s. 0d. to £81 0s. 0d., basis 60 per cent., Cr, scale 26s. 0d. to 27s. 6d. per unit; over 6 per cent. C, £74 10s. 0d. to £77 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 27s. 6d. per unit; 2 per cent. C,* 1s. 7½d. to 1s. 10½d. per lb. Cr.; 1 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 0.15 per cent. C,* 1s. 9d. to 2s. 0d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/72 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (standard).—78 per cent., £66 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons. £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic hard, over 0.41 up to 0.60 per cent. C £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68–70 per cent.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £66 10s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel-chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £234 0s. 0d. to £234 5s. 0d.; three months, £231 15s. 0d. to £232 0s. 0d.; settlement, £234 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 3½d. per lb.; rods, 253s. 6d. per cwt. basis; 20 s.w.g., 288s. 6d. per cwt.

Tin.—Cash, £792 10s. 0d. to £793 0s. 0d.; three months, £792 10s. 0d. to £793 0s. 0d.; settlement, £793 0s. 0d.

Lead (Refined Pig).—Second half August, £72 12s. 6d. to £72 15s. 0d.; second half November, £73 15s. 0d. to £73 17s. 6d.

Zinc.—Second half August, £86 10s. 0d. to £86 15s. 0d.; second half November, £85 0s. 0d. to £85 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £121 7s. 6d.; rolled zinc (boiler plates), all English destinations, £119 2s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £97 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 10⅝d. per lb.; sheets to 10 w.g., 202s. 0d. per cwt.; wire, 2s. 8½d.; rolled metal, 202s. 0d. per cwt.

Brass (Brazing).—BS1400, B3, £156; B6, £201.

Brass (High Tensile).—BS1400, HTB1, £187; HTB2, £202; HTB3, £214.

Gunmetal.—BS1400, LG2, £192; LG3, £202; G1, 1%, £254; G1, 1%, £239.

Phosphor Bronze.—BS1400, PB1 (AID released), £287; BS1400: 90/10/1, £272.

Leaded Phosphor Bronze.—BS1400, LPB1, £213.

Phosphor Bronze Strip, etc.—Strip, 290s. 9d. per cwt.; wire, 4s. 1½d. per lb.; rods, 3s. 4½d.; tubes, 3s. 4½d.; chill cast bars: solids 3s. 4½d.; cored 3s. 5½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £230; AB2, £242.

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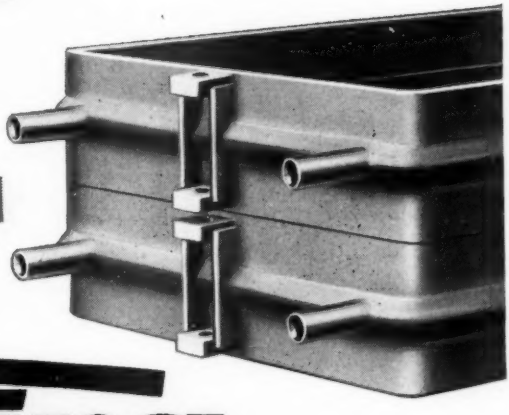

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Publications Received

Aluminium Rainwater Goods. Published by the Aluminium Development Association, 33, Grosvenor Street, London, W.1; price 10s. 6d.

Now that the aluminium industry has entered the rainwater goods field, it is pleasing to note from this booklet that the job has not been entirely lost to the foundry industry, as many components are offered in the cast state. This essentially high-grade publication utilizes good illustrations, and carries a number of blue prints and practical instructions for the installation of aluminium rainwater goods on various types of buildings; painting recommendations are also included. It should be of real service to architects.

Technical Notes, No. 197. Issued by CIBA (A.R.L.), Limited, Duxford, Cambridge.

This *Bulletin* is devoted to detailing uses of Araldite epoxy resins for foundry patterns. It is full of really sound information and amongst this is a table showing the amount of accelerator to use under varying circumstances. It appears that a wrong formulation causing excessive exothermic reaction can result in distortion. This pamphlet could act as a model for Press relations officers, because it accords to readers the courtesy of giving names and addresses of suppliers of the ancilliary materials. Only too often Press releases omit to give such information. It is recommended that all founders and patternmakers acquire this useful *Bulletin*.

British Instruments—Directory and Buyers' Guide. Published by United Science Press, Limited, Boswell House, Gough Square, Fleet Street, London, E.C.4; price £2 2s. 0d.

The function of modern industry is increasingly dependent upon scientific instruments. With the publication of this manual, sources of supply are made available in a readily accessible form. Moreover, this information, through French, German and Spanish glossaries, is equally available to foreign nationalities —a service enhanced by listing the manufacturers' agents overseas. Finally, in a standardized series of alphabetically arranged advertisements, the products of the various companies are illustrated and described. The whole is compressed into some 600 pages. This is unquestionably a valuable work of reference in the office of any purchasing agent.

Safety. The Magazine of Accident Prevention and Health. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

The most interesting article in this issue is "Foreman's Notebook," as it tells how a foreman got a 100 per cent. co-operation from his men in the wearing of safety goggles by merely asking a man not using them "What colour are your eyes?" and then producing a range of glass eyes and discussing their possible matching appearance. The article then goes on to detail the work done by the Factory Inspectorate in collaboration with representatives of the foundry industry and refers to the reports published in the FOUNDRY TRADE JOURNAL. In this issue is also illustrated, in colour, a wide and very good looking range of safety shoes for both men and women.

ARCHIBALD LOW & SONS, LIMITED, engineers and brassfounders, recently moved from Glasgow to new premises in Kirkintilloch. The company's Glasgow factory has been sold to Glasgow Corporation who want the land for redevelopment.

Book Review

Metal Fatigue. Edited by G. Sines and J. L. Waisman. Published by McGraw-Hill Publishing Company, Limited, 95, Farringdon Street, London, E.C.4; price 98s. 6d., post free.

As long as the most frequent cause of service failure of metallic components is fatigue, so long will there be a ready sale for new books on the subject. In their preface to the latest one, the editors make it plain that they have in mind the needs of engineers in designing machines for satisfactory life under conditions of repeated stress, and that they approach their task from the point of view of "know how" rather than that of "know why." However, first impressions are frequently important, and the conventional diagram of an edge dislocation with which the dust jacket is adorned can only be regarded as misleading, suggesting as it does the discussion of the fatigue process in terms of modern concepts. Let it be said at once that the index contains only one reference to dislocations, and that all attempts at explaining the "know why" of fatigue are left for others to make.

The book has been developed from a conference held at the University of California in 1953, and it is essentially a compilation of 17 separate chapters written by as many different authors. To review it adequately and concisely is difficult, for each chapter really calls for a review of its own, and even a list of chapter headings and authors would take up the available space. Chapter 2 gives a good general survey of the "Factors affecting Fatigue Strength," but the next one on "Basic Concepts of Fatigue Damage in Metals" can only be regarded as disappointing in a book first published in 1959. The treatment of metallographic changes caused by fatigue is superficial and somewhat dated; there is no mention of persistent slip lines, of "extrusion," of the experiments making use of surface removal to demonstrate the early formation of microcracks, or of the important work on sub-zero fatigue testing. Chapters 6 and 7, dealing with "Statistical Planning and Interpretation of Fatigue Tests" and "The Behaviour of Metals Under Complex Static and Alternating Stresses" are both very good. The next chapters deal adequately with residual stresses and with techniques of surface stressing to avoid fatigue, and thereafter the book is concerned primarily with aircraft applications. The chapters on cumulative damage and notch sensitivity will have a wider appeal, and many engineers will benefit from a study of "Estimation of Fatigue Life of Welded, Riveted and Bolted Structures." The final chapter discusses in an interesting way "Detection of Fatigue Damage" with special reference to aircraft structures.

From the engineering standpoint the editors have produced a comprehensive treatment of "Metal Fatigue," but one which would have been even more valuable if it were quite up to date. The absence of any mention of the International Conference on Fatigue held in London in 1956, and the fact that throughout the book there are but few references dated 1956 or later, suggest that the production of the book from the 1953 conference papers has taken too long. The effects of this are probably most noticeable in those chapters that touch upon the mechanism of fatigue, for it is in this field that advances have been most significant in recent years. In spite of these limitations, which could easily be removed in a later edition, the book can be recommended, for it brings together much of the information on fatigue most valuable to the engineer and presents it in a manner that should be widely acceptable. It is well illustrated and the general standard of production is good.

A. G. QUARRELL.